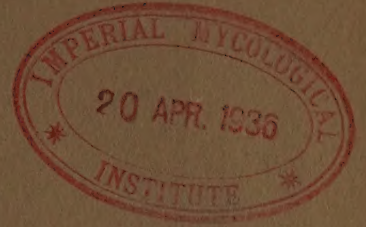


JAMAICA



ANNUAL REPORT

OF THE

Department of Agriculture

FOR THE

YEAR ENDED 31ST DECEMBER, 1934.

Ordered by His Excellency the Governor to be Printed.



JAMAICA
GOVERNMENT PRINTING OFFICE, KINGSTON
1935.

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DEPARTMENT OF SCIENCE AND AGRICULTURE, JAMAICA.

STAFF.

Director of Agriculture and Island Chemist A. C. Barnes, B.Sc., F.I.C., A.M.I. Ch. E.

HEAD OFFICE.

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 Accountant N. B. Donaldson.
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 Librarian Miss E. Marson
 Assistants, Typists and Stenographers Miss I. R. Mein.
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 Miss R. E. White.
 Miss M. McDonald.

PUBLIC GARDENS.

Superintendent and Plant Breeder M. S. Goodman.
 Horticulturist E. Downes.
 Clerk Miss E. Marson.

GOVERNMENT LABORATORY.

Deputy Island Chemist W. L. Barnett, M.A., B.Sc., F.I.C.
 Agricultural Chemist H. H. Croucher, B.Sc.
 Assistant Chemist E. N. Richards
 Technical Assistants E. K. P. Blake, O. W. Harrison, D. C.
 Davis, W. B. Dixon, Z. A. Daniels.
 Clerk and Storekeeper L. A. Boothe.

PLANT DISEASES AND PESTS.

Microbiologist F. E. V. Smith, B.Sc.
 Entomologist W. H. Edwards, D.I.C., F.E.S.
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 Supervising Inspector of Plant Diseases J. B. Sutherland.
 Inspectors of Plant Diseases 19 Inspectors.

AGRICULTURAL EDUCATION, EXPERIMENTS AND FIELD SERVICES.

Superintendent of Agriculture R. S. Martinez, Dip. Agr.
 Superintendent Sugar Cane Experiments M. S. Goodman.
 Agricultural Officer L. L. Carrington, Dip. Agr.
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 J. M. McEwen, D.I.C.T.A.,
 Headmaster Farm School J. W. Howe, B.S.A., M.Sc.
 Assistant Masters L. A. Powell, H. C. Virtue, V. A. Valentine.
 Superintendent Grove Place Stud Farm and Experi-
 mental Station A. F. Thelwell.

LIVE STOCK.

Veterinary Surgeon S. Lockett, V.M.D.
 Superintendent Hope Stock Farm J. W. Howe, B.S.A., M.Sc.
 Foremen Hope Stock Farm G. E. Redshaw, R. A. Amiel.
 Superintendent of Stock, Grove Place Stud Farm E. U. Lewis.
 Clerk, Grove Place Stud Farm R. N. Lewis.



DEPARTMENT OF SCIENCE AND AGRICULTURE.

Report for the year ended 31st December, 1934.

I.—GENERAL.

1. I have the honour to report that the Department of Science and Agriculture was under my administration for the whole of the year. With the exception of Mr. F. E. V. Smith, Microbiologist, the whole staff was on duty in the Colony during the year. Mr. Smith was absent on leave for the period June 2nd to the end of the year. The Divisional reports again give details of the varied activities of the Department and indicate the progress that has been made in a number of important directions. On January 15th and 16th a Staff Conference was held under my Chairmanship at Hope, with a view to discussing with officers of the Department a number of important matters. The Conference was attended by the Headquarters and Field Staff, Specialist Officers and members of the Farm Staff. The Chief Inspector of Produce, the Secretary and Supervisors of the Jamaica Agricultural Society were present by invitation. The deliberations of the Conference proved to be most valuable and it is proposed to hold one annually in the future. In July the Annual Summer Course of Lectures and Demonstrations was held at Hope and was well attended by Instructors of the Jamaica Agricultural Society and members of the public, while the Field Staff of the Department were brought in in order to give officers a further opportunity of discussing their work and of benefiting from the Course.

2. I have continued to develop closer associations with the Jamaica Agricultural Society and am glad to report that the spirit of co-operation between the Department and that Society, mentioned in my last report, continues to exist in an even stronger form. The Society, recognising the value of the advice accorded by the Agricultural Adviser to the Secretary of State, to the effect that more careful planning of instructional work was desirable, appointed a Planning Committee with the Director of Agriculture as Chairman. The results of the work of this Committee are already becoming apparent in the more concentrated and thus more effective work of the Agricultural Instructors. The Society received a considerable accretion of membership during the year and is showing healthy signs of expansion in various directions. The acquisition of a building and premises adjoining the existing office, by the Government, for the use of the Society, will enable the services rendered in connection with seed supply and disposal of members' produce to be improved and extended. Articles on agricultural subjects, contributed by members of the department, were published in the monthly journals of the Society.

3. The Advisory Committee on the Sugar Industry, appointed in January, 1934, linked the Department of Agriculture with the Sugar Manufacturers' Association, and the Sugar and Rum Industries generally in Jamaica, more closely than had hitherto been possible. Important developments during the year were the establishment of a departmental sugar production statistics branch of the Department of Agriculture, the cost of which is being met by an annual grant of £300 from the Sugar Manufacturers' Association of Jamaica; and the offer of financial support of the Central Sugar Cane Breeding Station, Barbados, by the same organisation, which has agreed to meet Jamaica's share of the expenses of the Station from the 1st October, 1936.

4. The Advisory Committee on the Banana and Citrus Industries continued to function during the year. As well as deliberating in Committee, a tour of the parish of St. Mary was arranged with a view to securing first-hand knowledge regarding the Panama Disease position in that parish; and on another occasion the Committee attended a meeting of banana planters held at Highgate to discuss the Banana Industry in relation to the inroads of Panama Disease. Following the recommendation made by the Advisory Committee on the Banana and Citrus Industries, a modification of the former method of treatment was authorised for a period of one year as a trial in the parish of St. Mary, whereby the diseased root only is destroyed, as compared with the normal method whereby the diseased root and all plants within a 16 ft. radius are cut down and destroyed.

5. I was appointed a Nominated Member of the Legislative Council in February, 1934, and was Chairman of a Select Committee appointed to consider and report upon measures for assisting the Banana Industry in times of difficulty caused by natural calamity. I was also Chairman of Committees which were appointed to deal with the following subjects:—The Tobacco Industry, the Pimento Industry, the Beef Industry, the Dairy Industry, the Citrus Industry, in relation to the affairs of the Jamaica Citrus Producers' Association, and the Catalina Land Settlement Scheme; and Member of a Committee on the Western St. Mary Land Settlement Scheme. Frequent opportunities of visiting country districts were taken, particularly in connection with half-yearly meetings of the Jamaica Agricultural Society.

6. The whole Department worked at high pressure throughout the year and all Divisions experienced considerable increases in the volume of work dealt with by them. The number of applications for personal assistance and advice by Specialist Officers continues to grow, with the result that in many cases important research work has been somewhat interfered with owing to the urgent requirements of the planting community in connection with particular problems. It is with much pleasure that I record again my gratitude to all members of the Department for their loyal co-operation during a very busy year.

7. Weather conditions generally in 1934 were favourable to agricultural production. The rainfall more nearly approached normal, the mean total for the Island being 79.82 inches, or 5.95 inches in excess of the average for 60 years. During the first half of the year the rainfall was 16% above the average, and in the second half 2% above the average. No floods or serious storms occurred during the year but local northers did some damage to banana cultivations in Eastern Portland and St. Thomas. In some districts, particularly Central Portland and St. Thomas, local droughts were experienced. As a result of the generally favourable weather conditions, coconuts showed a marked recovery, and banana production increased by 51% over the previous year.

8. Interest continued to be displayed in the use of underground water for irrigation purposes, particularly in the Plains of Lower St. Andrew where several more wells were sunk and brought into operation during the year. The protection and extension of forest resources and matters relating to the conservation of existing timber supplies and the planting of useful forest trees continued to receive attention. The importance of devising and putting into effect a forest policy, in relation to agriculture in the Island, was recognised by the Advisory Committee of the Colonial Development Fund, and a grant of £600 was authorised to meet the expenses of a survey and report by an experienced Colonial Forestry Officer. It is hoped that this important work may be completed during 1935.

9. The research and field work undertaken by the Department of Agriculture, and the field instruction services of the Jamaica Agricultural Society, were extended during the year. Additional provision for research on banana problems, and in particular the development of a commercial variety immune to Panama Disease, enabled new facilities to be provided for the Geneticist, so that at the end of the year a new Greenhouse, 40' x 9', was nearing completion, and additional experimental areas had been planted with a wide range of banana varieties for use in the work on breeding. Six plots in banana growing districts where conditions differ widely, totalling seven acres, were planted with the Cavendish banana in order to enable more detailed storage and shipping trials to be conducted in 1935. Three small trial shipments of the Cavendish banana were made during early 1934, with the co-operation of the Jamaica Banana Producers' Association. The results indicated that with careful attention to details of cutting, handling and transport in Jamaica, this variety could be landed in satisfactory condition in England. The market price, however, in relation to that of the Gros Michel, is not attractive; but as the Cavendish is immune in Jamaica to Panama Disease, it still remains a possibility as an alternative to the Gros Michel to a limited extent. Of the seedlings developed prior to the arrival of the Geneticist, two showed very promising fruit, and small trial shipments of one known as S. 19 were very well received in England. The fruit carried well and ripened to a bright colour while the finger length and texture of the flesh closely resembled the Gros Michel.

10. Manurial experiments were continued by the Agricultural Chemist with bananas and sugar cane. No significant results have yet been secured with the former and it appears unlikely that any visible return commensurate with the cost of manuring will be secured to the grower unless the fruit is sold by weight. It had been hoped that manuring would lead to an increase in the grade of fruit—that is in the proportion of bunches of 9-hands or more. Though there is some indication that this can be realised in practice, it is necessary to continue experiments and to make comparative weighings before a definite conclusion can be recorded. Trials of this description are conducted under the combined supervision of the Agricultural Department and the planter, the latter taking the fruit. Under commercial conditions it is not possible to give that detailed examination to individual bunches of fruit which is necessary to enable results of scientific and practical value to be obtained. It has therefore been found desirable to modify the manner of conducting such experiments.

11. The Sugar Industry continues to progress and the two laws passed during the year—the one to control the ether content of rum manufactured in Jamaica and the other to control and regulate the manufacture of rum in the Island—will tend still further to improve the position of the industry. Estate practice has advanced considerably during recent years and the production of cane per acre is increasing as a result of better cultural methods and careful selection of planting material. The average weight of cane produced per acre, including plants and ratoons, on the 34 estates in the Island, was 27.3 tons during the season 1933-34.

12. There is a general tendency to improve the equipment of sugar factories and to increase their efficiency. Work on the erection of a new sugar factory at Caymanas Estate, St. Catherine, was commenced during the latter part of the year. It is expected that this factory will commence production in 1935 and thus replace the existing old and inefficient mill.

13. A survey of the incidence of damage of the sugar cane Moth Borer (*Diatrea Saccharalis*), conducted during the year by the Entomologist, indicated that this is not a pest of economic importance in Jamaica.

14. The development programme for the Citrus Industry was pursued with vigour, and plants from the two large nurseries established in 1933 were ready for distribution from early September, 1934. Ten thousand Marsh Seedless plants had been distributed and planted by the end of the year. The system adopted ensures that the land is ready to receive the plants before they are issued from the nursery, and

persons taking them are required to give an assurance that they will permit authorised officers to inspect and advise on their after-care.

15. Panama disease continues to be a serious menace to the Banana Industry and measures for the control of its spread were rigidly enforced. The expected increase in the incidence of the disease as a result of the heavy rains of 1933 became apparent during the year, but despite this adverse factor it is noteworthy that banana production shows a marked tendency to increase, the estimated output for 1935 being 24-25 million stems. The position in regard to the Banana Industry is much more hopeful now that promising seedlings immune to Panama Disease, which produce fruit almost indistinguishable from the Gros Michel, have been developed. It is however increasingly evident that agriculture in Jamaica requires the permanent background provided by orchard crops, more particularly since pimento and logwood have declined in value to so marked an extent.

16. The Cocoa Industry continues to remain dormant and coffee production shows a tendency to decrease while the markets for varieties other than the Blue Mountain have become much less attractive than formerly. The need for active propaganda amongst the peasant proprietors, both by the Department of Agriculture and the Jamaica Agricultural Society, is very apparent; and though definite advances in field instructional work have been made during the year, still greater activity is essential.

17. The summary of the production of main crops in 1934 will be found in Chapter VI of the Annual Report on the social and economic progress of Jamaica for the year 1934 but it may be mentioned here that the exports of bananas amounted to 15,974,906 stems as compared with 10,557,369 stems in 1933: an increase of 51%.

18. Departmental publications on the following subjects were issued during the year:—

Bulletin No. 1 (New Series)—“Survey of the yields from seedling varieties of sugar cane in Jamaica—1932/33”. Report by H. H. Croucher and M. S. Goodman.

Entomological Circular No. 14—“Pests of Banana in Jamaica”. W. H. Edwards.

Bulletin No. 2 (New Series)—“Field Experiments on sugar cane in Jamaica—1932/33.” Report by H. H. Croucher.

Bulletin No. 3 (New Series)—“The Cultivation of Citrus in Jamaica.”

Leaflet—“Citrus Planting.”

STAFF CHANGES.

19. *Retirement*.—Mr. L. A. Wates, Travelling Instructor, retired from the Service on 31st March 1934, on attaining the age limit, having served the Department for nearly six years and, previously, the Jamaica Agricultural Society for some 19 years.

NEW APPOINTMENTS.

Mr. L. L. Carrington, formerly on the staff of the Jamaica Agricultural Society, was appointed Senior Agricultural Officer.

Messrs. H. C. Miller and J. M. McEwen, graduates of the Imperial College of Tropical Agriculture were appointed Junior Agricultural Officers.

Mr. L. C. Anderson was appointed an additional Inspector of Plant Diseases.

Mr. W. B. Dixon was appointed a Technical Assistant in the Entomological Division.

PROMOTIONS.

Head Office.—The post of Accountant was declared to be pensionable office.

Mr. R. A. White, Assistant, was promoted to a Second Class Clerkship.

Miss M. McDonald, Temporary Clerk, was appointed an Assistant.

Government Laboratory.—Mr. Z. A. Daniels, Apprentice, was appointed Technical Assistant.

The following officers were granted leave during the course of the year:—

Head Office.—

Miss V. M. Barrows	..	..	8 weeks.
Miss I. R. Mein	..	..	6 weeks.
Miss R. E. White	..	..	6 weeks.

Farm School.—

Mr. L. A. Powell	..	..	2 weeks.
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Government Laboratory.—

Mr. F. E. V. Smith	..	..	6 months
Mr. R. S. Martinez	..	..	3 weeks.
Mr. E. K. P. Blake	..	..	6 weeks.
Mr. O. W. Harrison	..	..	8 weeks.

(Sgd.) A. C. BARNES,
Director of Agriculture and Island Chemist.

II.—PUBLIC GARDENS.

Report of the Superintendent and the Horticulturist.

1. HOPE GARDENS.

Weather.—The year under review was marked as one in which no damage was done in the Gardens by high winds or hurricanes. The rainfall of 58.17 ins. was slightly higher than the average for the past 53 years.

Orchids.—The collection of seedling hybrid *Cattleyas*, *Laeliocattleyas* and *Brassocattleyas* which were germinated by the asymbiotic method during 1931 continue to make excellent growth and there are a number of plants that show every sign of producing their first flowers early in 1936.

The main collection of orchids provided a successive showing of blooms in the Orchid House throughout the year.

The small collection of *Calanthes* has been increased by purchase during the year to 50 plants. *Calanthes* grow very satisfactorily at Hope and their time of flowering, November to February, makes them popular as a decorative flowering plant in the Orchid House during the tourist season.

Flower Beds and Borders.—The flower beds on the Main Lawns were maintained in a floral setting throughout the year by a successional planting of annuals and perennials. Two half-circular beds planted with Sutton's selected Zinnias in multicoloured varieties attracted a good deal of public interest during the Easter season.

Bulb Garden.—The collection of hybrid *Hippeastrums* was taken up in November and rested. The ground was well dug and heavily manured in preparation for the bulbs which were again planted after 'resting' for two months.

Plant Houses.—The Public Works Department erected a double Plant House on the site of the old Plant House which was demolished the previous year. The interior of the house has a layout of a water pool in the centre and around the pool are arranged Caladiums, Anthuriums, Rex Begonias, Calathea while on the side stagings are ornamental and flowering plants among which are Torenias, Begonias, Gloxinias, Coleus, Dracaenas, Dieffenbachias, Achimenes, etc. This house was opened on the visit of Princess Marie Louise and Princess Helena Victoria to the Gardens on February 17th.

Sunken Garden.—The construction of the dry packed stone walls enclosing the Sunken Garden, removal of earth and the layout of the site in lawn and flower borders were completed during the year, thus bringing to a close a work which was started in 1931 and carried on as time and money allowed without interfering with the general progress of the Gardens in other directions. During September, October and November a pleasing display was obtained in the Sunken Garden by massing multi-coloured Zinnias in the lower borders which run the length of the Gardens.

Extensions.—A portion of the land, 50 ft. wide, on the eastern side of the main avenue was cleared of Guinea grass and Uba cane and the ground ploughed, levelled and planted with Bahama grass. A border of flowering shrubs has been planted the length of the avenue.

Twelve hundred feet of $\frac{3}{4}$ " piping was connected to the main water supply in the Gardens and laid along the border to the main entrance gate. With this extension of the water supply it is now possible to develop the adjoining lands on either side of this avenue.

As funds become available it is planned to extend the present layout and to establish an arboretum of native and exotic trees.

Exhibitions.—An exhibit of flowering orchids and other cut flowers was sent from the Gardens to the Manchester Horticultural Show which was held at Mandeville on May 24th, 1934. The exhibit covered a frontage of 30 ft. and was comprised of *Cattleyas*, *Phalaenopsis* and *Cypripediums* and among the cutflowers were *Hippeastrums* and *Crossandra*.

The Gardens also contributed some orchid blooms to the collective exhibit of orchids which was sent by the Jamaica Orchid Society on the Pan American Airplane to the International Tropical Flower Show held at Miami, Florida, on March 12th, 1934. The Society was subsequently awarded a silver Vase for its exhibit.

By kind permission of the Director of Agriculture the Jamaica Orchid Society held a non-competitive exhibition of flowering orchids in the New Plant House during the week-end May 18th to 20th. The exhibition attracted a large number of visitors to the Gardens.

Visitors.—Among the thousands of visitors to the Gardens during the year were Their Royal Highnesses Princess Marie Louise, Princess Helena Victoria and Princess Alice, Countess of Athlone. Other distinguished visitors were Sir Edward Davson and Lady Davson; Mr. Ashton of Tunbridge Wells, England; Dr. Harris, Director of the Biological Laboratory, Cold Spring Harbor, New York, U.S.A.; Prof. J. H. Faull, Harvard University; Dr. A. McIntosh, Geneticist, Central Cane Breeding Station, Barbados.

In February a party of 40 farmers cruising under the auspices of the Pennsylvania Farmers' Magazine were conducted through the Gardens and Experiment Station. Another party of 19 farmers cruising under the auspices of the American Agricultural Farmers Newspaper of New York visited the Gardens and were shown plants of interest growing in the Gardens and Experiment Station.

Botanical Specimens.—In July a number of botanical specimens were supplied for the University of London Intermediate Examination. Botanical specimens were also supplied for the Cambridge Local Examinations, Junior, School Certificate and Higher School Certificate.

Correspondence.—During the year 2,680 letters were received in this office and 1,496 letters were sent out, not including stereotyped circulars which are sent out in reply to letters in connection with the purchase of plants and replies to interdepartmental minutes.

Literary Contributions and Lectures.—The Superintendent of Public Gardens contributed to the Journal of the Jamaica Agricultural Society an article on "The Establishment and Upkeep of Citrus Orchards" and gave a lecture on "Seedling Canes and Their Requirements in regard to Soil" at the Agricultural Short Course for Agricultural Instructors. A lecture and demonstration on "Citrus Planting" was also given in association with Mr. Sutherland, and a demonstration on Citrus Budding to the members of the St. Andrew Branches Associated. The Superintendent also assisted in compiling the Bulletin "Citrus in Jamaica".

The Horticulturist contributed an article to the Journal of the Jamaica Agricultural Society entitled "In the Garden" which appeared in the December number of the Journal, and also gave a lecture and demonstration on "Methods of Plant Propagation" at the Agricultural Short Course for Agricultural Instructors held at Hope from July 23rd to July 27th, 1934.

Meetings.—The following meetings, etc., were attended by the Superintendent of Public Gardens:—

- January: Attended the Staff Conference at the Farm School which was opened by the Hon. Colonial Secretary Sir Arthur Jelf, Kt., C.M.G.
- April: Attended meeting of the Advisory Committee on the Sugar Industry.
- June: Attended meeting in the Director's Office with reference to an Agricultural Short Course for Agricultural Instructors.

- July: Attended opening of Agricultural Short Course at Farm School for Agricultural Instructors which was also open to the Public.
 Attended the following lectures: "Citrus Pests", "Maintenance of Banana Soils", "Coconuts", and "Cane Cultivation for the small Farmer".
 Attended Citrus Conference in the office of the Director of Agriculture.
- November: Attended meeting in the Director's office with reference to the All Island Exhibition to take place at May Pen.

The Horticulturist attended the following meetings in connection with the activities of the Department:—

- Jan. 15th Department Staff Conference at Hope.
- June 22nd: Attended meeting in the office of the Director of Agriculture with reference to the Agricultural Short Course for Agricultural Instructors.
- July 23rd: Attended at the opening of the Agricultural Short Course at the Farm School.
- November: Attended meeting in the office of the Director of Agriculture with reference to the All Island Agricultural Show at May Pen on Easter Monday April 22nd, 1935.

Transfers.—Foreman Robinson of Hope Gardens was transferred to King's House Gardens on April 30th, Foreman Clough of King's House Gardens to Parade Gardens and Foreman McDonald of Parade Gardens to Hope Gardens.

Routine Work.—The routine work of the maintenance of the gardens and the propagating and distributing of nursery stock was regularly attended to.

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1934.

Sold.

Economic Plants:—				
Coffee	..	..	..	11,080
Citrus Seedlings	..	..	..	1,577
Citrus—Budded Plants	..	..	..	1,223
Mango—Grafted Plants	..	..	..	953
Miscellaneous	..	..	..	3,124
				17,957
Ornamental Plants	..	..	..	22,131
				40,088

Free Grants.

Economic Plants:—				
Coffee	..	..	..	1,036
Citrus Seedlings	..	..	..	26
Citrus—Budded Plants	..	..	..	33
Mango—Grafted Plants	..	..	..	22
Cane Tops and Cuttings	..	..	..	163,785
Elephant Grass Cuttings	..	..	..	600
Timber Trees	..	..	..	3,341
Miscellaneous	..	..	..	115
				168,958
Ornamental Plants	..	..	..	4 736
				173 694
Total Number of Economic Plants	..	..	..	186 915
Total Number of Ornamental Plants	..	..	..	26,867
				213,782

Total Number of Plants Distributed .. 213,782

The following statement shows the distribution of plants for the past five years from the Nursery at Hope.

	1934.	1933.	1932.	1931.	1930.	Total.
Coffee	12,116	8,656	15,891	28,044	39,660	104,367
Cacao	..	..	194	76	247	517
Citrus—Seedlings	1,603	6,358	52,740	31,584	65,494	157,779
Citrus—Budded Plants	1,256	859	1,122	1,010	1,633	5,880
Mango—Grafted Plants	975	1,520	865	1,322	1,729	6,411
Cane Tops and Cuttings	163,785	226,864	261,233	171,337	143,002	966,221
Elephant Grass Cuttings	600	500	9,500	9,800	17,600	38,000
Timber Trees	3,341	16,102	10,767	56,864	37,898	124,972
Miscellaneous Fruit and Economic Plants	3,239	12,187	8,373	6,643	3,113	33,555
Ornamental Plants	26,867	15,425	27,167	33,183	31,288	133,930
	213,782	288,471	387,852	339,863	341,664	1,571,632

2. CASTLETON GARDENS.

Weather.—The rainfall for November was 55.41 ins. the greater part of which fell from the 13th to the 19th when over 49 inches was recorded. On the 17th 16.80 ins. was recorded and the pathways were badly scoured and gravel had to be headed from the river for re-surfacing the pathways.

Fernery.—The fernery was enlarged to accomodate a larger variety of native ferns which are found growing in the woodlands surrounding the Gardens.

Introductions.—Seeds of *Lecythis elliptica* were received from Mr. J. E. Higgins, Director of the Canal Zone Experiment Gardens and planted in the Gardens. The fruit of *Lecythis elliptica* is similar to the fruit of *L. zabucajo* which produces the Sapucaia nut, but is much smaller being about the size of a pea nut.

Amherstia nobilis.—The trees of *Amherstia nobilis* flowered very freely in the Gardens during the months of January, February and March.

Garcinia mangostana.—A fair crop of fruits of the Mangosteen (*Garcinia mangostana*) was gathered in December.

Routine.—The general routine work of billing lawns, opening flood drains, repairing pathways, forking and weeding borders and propagating plants for nursery sale was regularly attended to.

Visits.—The Horticulturist inspected the Gardens.

PLANTS DISTRIBUTED FROM CASTLETON GARDENS, 1934.

<i>Sold.</i>			
Economic Plants	..	..	21
Ornamental Plants	..	..	337
			358
<i>Transferred to Hope.</i>			
Economic Plants	..	..	633
Ornamental Plants	..	..	5,017
			5,650
Total Number of Economic Plants	..		654
Total Number of Ornamental Plants	..		5,354
			6,008

3. PUBLIC GARDENS, KINGSTON.

Parade Court House Site.—The Department took over the maintenance of the old Parade Court House site, adjoining the Parade Gardens, in the early part of the year. The site was cleared of brick rubble and a top-surfacing of good soil laid over the surface to provide suitable material for establishing lawns. Ten large beds were prepared for planting Cannas. The beds were dug out 2 ft. deep and the earth which was chiefly made up of gravel and bricks was removed from the site. Compost from the Garden rubbish dump near by was used in preparing the beds. Excellent results are now being obtained with a variety of Cannas in these beds.

Tool House.—The Public Works constructed a concrete Tool House for housing the Garden tools, etc. A portion of the land adjoining the Tool House has been enclosed with an iron fence to provide space for the Garden refuse.

Water Lily Tank.—The central Lily Tank was emptied and cleared of water weed and new mounds of earth prepared for replanting the Water Lilies.

Routine Work.—The general routine of maintaining the Victoria Park, the lawns around the Public Buildings, the Memorial Square, the old Treasury Site and Headquarter House Gardens was regularly attended to.

Transfer.—On April 30th Foreman McDonald was transferred to Hope Gardens and Foreman Clough of King's House was sent to Parade Gardens.

4. HILL GARDENS, CINCHONA.

The Horticulturist visited the Hill Gardens, Cinchona, and remained in residence for one week inspecting the Gardens and adjoining woodlands. A number of trees of no botanic or economic value which had been allowed to grow up during the course of years and overcrowd other trees of rare botanical interest were dug out, and other sections of the Gardens which had become overgrown with bush were cleared under the supervision of the Horticulturist.

The Gardens in general were satisfactorily maintained by the Foreman in charge with the limited funds voted for the maintenance of the Gardens and woodlands at Cinchona.

Xmas Trees.—A large number of Pines and other suitable trees were again supplied from the Cinchona woodlands to meet the demand for Xmas Trees.

Routine Work.—The usual routine work of mowing lawns, weeding and forking borders, repairing pathways and clearing woodland pathways was regularly attended to.

5. KING'S HOUSE GARDENS AND GROUNDS.

On the 1st April the Department of Agriculture was asked to take over again the supervision of the King's House Gardens and Grounds.

Bombay Mangoes.—Five old mango trees were dug out of the lawns to the south-east of the Gardens to make room for six young grafted Bombay Mango plants which have been planted in the vicinity where the old trees were growing.

Bulbs and Flower Seeds.—Five hundred Gladioli, one hundred Dahlia tubers and an assortment of annuals were purchased for the Flower Garden in accordance with Lady Denham's expressed wish for these plants.

House Decorations.—On the occasions of special social functions at King's House the Horticulturist did the floral decorations in the Ball Room and Main Hall.

The floral decorations in the house were carried through by the garden staff throughout the year.

Extension of Flower Garden.—The new layout of Flower Gardens to the north of the Rose Garden which Lady Slater was directing up to the time of her Ladyship's departure from King's House on April 10th, 1934, was carried to completion under departmental guidance.

Two borders running the length of the lower section of the Flower Garden were opened up and prepared for planting annuals and perennials for mass floral effect.

Kitchen Garden.—The Kitchen Garden site which had been out of use as a vegetable garden for several years was re-established with an assortment of fresh vegetables to supply the domestic requirements in King's House.

Pastures.—The pastures under the care of Mr. Harold Bolton and Mrs. J. A. Crooks were maintained in a satisfactory condition. The pastures under the control of the Department were cleaned during the year and the fences kept in good condition.

Transfers.—On April 30th Foreman Clough was transferred to Parade Gardens and Foreman Robinson of Hope Gardens was sent to King's House.

6. GORDON TOWN GARDEN.

The small garden at Gordon Town was maintained in a tidy condition out of the Hope Gardens Maintenance Vote.

7. BATH GARDEN AND NURSERY (ST. THOMAS).

Mr. R. Glen Campbell, Inspector of Plant Diseases, is in charge of this Garden and Nursery.

Nursery.—The Coffee nursery which suffered badly during the drought, when most of the plants died, has again been established.

Flower Beds.—Varieties of Cannas, Coleus and other plants were sent from Hope Gardens to replant some of the depleted beds and give colour to the Gardens. The Cannas have flowered and are making a beautiful show of colour.

Visitors.—There was a large number of visitors to the Gardens during the year.

Routine.—The usual routine work was carried out and the Gardens kept in a tidy condition.

Head Gardener.—Henry Messam, the Head Gardener, died during the year and has been replaced by Henry McKoy.

SUMMARY OF PLANTS DISTRIBUTED BY THE DEPARTMENT DURING THE LAST FIVE YEARS.

	1934.	1933.	1932.	1931.	1930.	Total.
Coffee	12,116	10,356	15,891	28,044	39,660	106,067
Cacao	..	..	419	78	247	744
Citrus—Seedlings ..	1,603	6,358	52,760	31,584	65,494	157,799
Citrus—Budded Plants ..	1,256	859	1,122	1,010	1,633	5,880
Mango—Grafted Plants ..	975	1,520	865	1,322	1,729	6,411
Cane Tops and Cuttings ..	163,785	226,864	261,233	171,337	143,002	966,221
Elephant Grass Cuttings ..	600	500	9,500	9,800	17,600	38,000
Timber Trees	3,341	16,102	10,767	56,864	37,898	124,972
Miscellaneous Fruit and Economic Plants	3,429	14,147	8,463	6,734	3,872	36,645
Ornamental Plants	26,867	22,746	28,141	33,940	50,690	162,384
	213,972	299,452	389,161	340,713	361,825	1,605,123

9. The Plantation and Garden Sales for the last five years have been as follows:—

1934	..	£509 13 1
1933	..	550 8 6
1932	..	613 1 9
1931	..	699 11 1
1930	..	761 19 9

10. The Rainfall at the various Gardens for the year under review is as follows:—

1934.	Hope Gardens.	Castleton Gardens.	King's House Gardens.	Public Gardens, Kingston.	Hill Gardens, Cinchona.
	Ins.	1Ins.	Ins.	Ins.	Ins.
January	1.78	15.87	3.15	0.76	7.83
February	3.72	15.59	4.26	3.05	9.70
March	2.74	4.18	2.05	1.70	2.39
April	2.03	11.07	3.05	0.63	1.43
May	3.10	18.57	2.32	1.78	5.37
June	2.82	3.89	3.64	0.99	2.93
July	1.61	12.70	1.16	0.91	3.71
August	7.37	13.27	5.70	4.78	7.28
September	9.06	12.84	4.54	2.75	5.87
October	9.80	12.12	5.15	3.77	14.78
November	11.60	55.41	7.53	3.49	26.90
December	2.54	8.10	2.00	1.72	7.66
	58.17	183.61	44.55	26.33	95.85

RAINFALL FOR THE FIVE YEARS 1930-1934.

Year.	Hope Gardens.	Castleton Gardens.	King's House Gardens.	Public Gardens, Kingston.	Hill Gardens, Cinchona.
	Ins.	Ins.	Ins.	Ins.	Ins.
1930	39.22	88.14	31.57	16.58	86.19
1931	61.87	148.87	48.92	34.17	105.51
1932	50.15	142.25	34.05	23.58	78.84
1933	113.28	298.20	50.93	74.52	170.42
1934	58.17	183.61	44.55	26.33	95.85

11. Contributions to the Gardens have been received from the following:—

Local.

F. E. V. Smith, Microbiologist, Hope.
D. L. Feurtado, I.S.O., Unity Cottage, Half-way Tree.
Leslie Mordecai, Kingston.
G. C. Gunter, Jamaica Government Railway, Kingston.
Hon. Mrs. J. Hamilton, Potosi, Bath.
Ronald J. Wynne, Mandeville.
Mrs. A. C. Saward, Kelso, Halfway Tree.
H. Q. Levy, Brown's Town.
Mrs. B. Crowden, Bridge Pen, Halfway Tree.
Jamaica Agricultural Society, Kingston.
Miss Austin, Mona Hotel, Liguanea.
Edward Foster, Montego Bay.
Miss M. Cowper, Wolmer's Girls' School, Kingston.

Foreign.

F. G. Walsingham, Harvard University, Cienfuegos, Cuba.
Messrs. Vilmorin-Andrieux & Cie., Paris, France.
Conservator of Forests, Cyprus.
Canal Zone Experiment Gardens.
Royal Botanic Gardens, Kew, Surrey, England.
Hawaii Agricultural Station, Honolulu.
Director of Agriculture, New Guinea.
Holger Johansen, Sugar Plant Field Laboratory, Porto Rico.
Dr. S. C. Harland, Cotton Research Station, Trinidad.
Dr. M. Grabham, Madeira.
Dr. Bonazzi, Cuba.
Mr. Rausch, Medellin, Colombia.
Lt.-Col. F. C. Lewis, Monteagle Farm, Yateley, Hants., England.
Prof. Juan Balme, Mexico.
Royal Botanic Gardens, Trinidad.
V. Launder Millin, 8 Napier Terrace, Napier, N. Z.
Director of Agriculture, Fiji.
U. S. Department of Agriculture.

M. S. GOODMAN,
Superintendent of Public Gardens.

E. J. DOWNES,
Horticulturist.

III.—AGRICULTURAL EXPERIMENTS.

EXPERIMENT STATION, HOPE.

Report of the Superintendent.

Weather.—The rainfall for the year under review at the Station was about the average for the past 53 years. We did not get our usual May rains and the summer rains did not come until August when, on several occasions, heavy deposits were experienced and the Station roads were damaged by the flood water from the hills to the north of the Station.

Owing to the Reservoir which supplies water for irrigation being out of commission there was very little water available for irrigation during the dry months January to July.

Distribution of Cane Varieties.—During the year 163,785 tops and cuttings of the different varieties of sugar-cane were distributed, making a total of 4,548,055 tops and cuttings distributed free to estates and small cane farmers for the past fifteen years.

It will be seen from the list below that the greatest demand was for those varieties which are highly resistant to Mosaic Disease and of good commercial value.

Small settlers, when applying for cane varieties, are always advised to plant the varieties which are highly resistant to Mosaic Disease, as it is difficult to get the small cane farmer to rogue for Mosaic Disease.

The following is a list of the varieties and quantities distributed for the five years 1930-1934.

Varieties.	1934.	1933.	1932.	1931.	1930.	Total.
P.O.J. 2878	73,449	74,869	112,538	33,549	4,628	299,033
P.O.J. 2725	26,492	52,032	57,179	43,722	49,001	228,426
P.O.J. 2714	18,548	21,701	24,707	18,744	4,892	88,592
P.O.J. 2727	9,178	22,922	21,807	18,594	35,123	107,624
Uba	11,850	22,797	31,200	46,204	27,874	139,925
B. 726	6,764	4,315	400	..	..	11,479
S. C. 12/4	3,808	3,675	2,659	2,936	2,565	15,643
White Transparent	3,773	2,878	1,196	2,034	1,162	11,043
E. K. 28	2,784	6,175	4,804	1,012	500	15,275
B. H. 10 (12)	2,315	5,135	1,012	2,111	1,150	11,723
B. 417	1,255	5,036	998	484	2,080	9,853
Ba. 11569	1,121	620	460	733	9,215	12,149
Mexican Striped	824	208	836	..	549	2,417
Co. 213	500	200	500	..	..	1,200
Co. 281	500	200	500	..	..	1,200
B. 891	412	4,015	400	..	..	4,827
H. 109	200	36	12	..	600	848
M. P. R. 28	12	..	..	..	..	12
Badilla	..	50	25	716	400	1,191
B. 1529	..	..	..	500	13	513
C. H. 64/21	..	..	..	..	2,650	2,650
P. O. J. 2379	..	..	..	..	600	600
Total	163,785	226,864	261,233	171,339	143,002	966,223

Cane Varieties.—The two cane varieties Mayaguez 28 and Fajardo Central 916 which were imported during 1933 and were grown in quarantine at the Government Laboratory for a period of one year were, after showing no signs of disease, released from quarantine and have been planted out in the Experiment Station at Hope. Cuttings of them will be available for distribution during 1935.

The P.O.J. 2878 has been again this year in great demand and the largest quantity of cuttings distributed was of this variety. Cane farmers applying for cuttings and who are in districts where Mosaic Disease is prevalent have been supplied with this variety. This cane ratoons well in the Station.

The varieties P.O.J. 2727, 2725 and 2714 have also been in demand and fairly large quantities of them have been distributed.

The demand for B. 726 has not been large owing to its susceptibility to Mosaic Disease and there are few, if any, places in Jamaica which are free of this disease.

The demand for E.K. 28 was large but owing to having to cut up the small plot of ratoons for replanting another plot we could not meet the demand for cuttings.

An old field of ratoons was discarded and the land ploughed and replanted in B. 726, B.H. 10/12 P.O.J. 2725, P.O.J. 2727, and E.K. 28 during the early part of the year. There was insufficient rainfall during these months and a very poor germination was obtained. The field could not be supplied until the rains came in August which resulted in a very irregular stand of canes.

Bananas.—The field containing the following varieties, Gros Michel, Robusta, Ram Kelat, Rubra, White House, Giant Fig, Apple, Cavendish and Pink Jamaica, and which had been under banana cultivation for several years was thrown out of cultivation at the end of this year. The ratoons had become very small and anæmic and the field will be planted out in a leguminous crop before being planted out in cane varieties. The banana varieties will be planted out in another field.

Trapping for Banana Borer (*Cosmopolites sordidus*, Germar) was continued during the year but very few borers were found. This method of control has been found very effective. The ratoons were intercultivated during the year. These plots were grown chiefly for demonstration to the Students and to provide material for the Geneticist.

Citrus.—A cover crop of *Crotalaria usaramoensis* was grown through the grove with the idea of improving the soil and keeping down weeds. This has been very beneficial as during the drought when the *Crotalaria* was cut down and spread through the grove it was noticeable that the citrus plants did not suffer as badly as during previous droughts when there was no cover crop grown through the grove.

Several of the grapefruit trees which produced inferior fruit were top-worked and budded with the Marsh Seedless Grapefruit.

Large numbers of Sour Orange seedlings were set out during the year in the Students' Garden. These will be budded with Navel Orange.

No spraying was done in the Citrus Grove during the year as the 'Eddie' Wasp (*Eretmocerus serius*, Silv.), a natural enemy of the Black Fly has proved itself capable of keeping the Black Fly under control. Before the introduction of the 'Eddie' Wasp into Jamaica although several sprayings with insecticides were done each year, it was with difficulty that the Black Fly was kept under control.

Coffee.—Owing to the drought experienced during the first part of the year the coffee crop was a small one. The old coffee plot which is well shaded with large Guango trees (*Pithecolobium saman*) did not suffer from the drought. The plot which was planted about eighteen months ago and which is not properly shaded suffered badly and several of the young trees died during the dry months.

Cacao.—During the year all pods and fallen leaves were gathered and buried in holes between the rows. A fair amount of cacao was reaped during the year. This plot is attended to by the Farm School Students who do all the work of pruning, picking, fermenting and drying.

Pawpaw.—Several strains including wild varieties from Cuba and Panama were planted for the Geneticist for breeding purposes but unfortunately most of them developed Mosaic Disease. Collection of seed is being continued with the hope of obtaining a strain that is either immune or resistant to Mosaic.

Tomatoes.—In accordance with the suggestion made by the Vegetable Conference which was held in Jamaica during 1933 that Jamaica should grow tomatoes to be put on the Canadian market at a time when it would not interfere with the tomato trade from the other West Indian Islands which were growing tomatoes for the early market in Canada, an experiment was started at the Hope Experiment Station. A field of approximately $1\frac{3}{4}$ acres was prepared in January and planted out in February with the following varieties:—June Pink, Kilgore's Special, Kilgore's Crown Selected Marglobe, Kilgore's Bred-Rite Cooper's Self-Topper, Kilgore's Bred-Rite Marglobe, Kilgore's Extra Selected Globe, Cooper's Special, Scarlet Topper, Bonny Best, Marglobe and Livingston's Globe. The following varieties were also planted out for trial in the English Market:—Kondine Red, Sutton's Best of All and Sutton's Perfection.

The results of these experiments clearly demonstrated that tomatoes cannot be grown to perfection in the plains in Jamaica after February. This coincides with past experience that tomatoes cannot be grown successfully in the lowlands after February. Although some of the varieties gave fairly large yields there was not sufficient marketable fruit obtained from any one plot that was worth packing for a trial shipment. Several boxes of the English varieties of tomatoes were shipped to England but these on arrival were considered undersized and poor.

Pigeon or Congo Peas. The following varieties were received from the Hawaii Agricultural Experiment Station through the U. S. Department of Agriculture, Washington, and were planted in the Experiment Station:—

Variety New Era Strain 'X'
Variety New Era Strain 'D'
Variety Local Grey
Variety Prensado

A portion of these seeds was forwarded to Grove Place for trial. The results of these varieties will be given in next year's Report.

Cantaloupe.—The following varieties were tested:—

Cantaloupe from Mr. Seymour—variety unknown
Cantaloupe and Cucumber cross from Mr. Seymour
Cantaloupe var. Banana.

A severe drought was experienced just as the plants began to flower and they died before maturing any fruit. From indications it appears that the Cantaloupe var. Banana is a prolific bearer.

Cover Crops and Green Dressing.—Seed of the varieties *Centrosema pubescens*, *Calopogonium mucunoides* and *Desmodium Scorpiurus* was received from New Guinea but they failed to germinate.

Seed of Bush Velvet Bean was received from the U.S. Department of Agriculture. These have shown great promise and have seeded profusely.

Lucerne seed received from England germinated well but made poor growth even during the rainy season. The plants, however, always have an anemic look as if they are not happy under the conditions existing in the lowlands. The soil in which they are planted is a deep loam.

Diseases.—There was, on two occasions during the year, an outbreak of Mosaic Disease on the varieties S.C. 12/4 and B. 726. This could not be accounted for as these plots were surrounded by plots of the resistant P.O.J's. 2878 and 2725 and all the other plots were free of the disease.

Insect Pests.—The Moth Borer was not much in evidence this year. A survey of the cane plots in the Station was made by the Entomologist for Moth Borer infection.

Students' Garden.—The Students' Garden which was situated in the Experiment Station was removed during the year to a more convenient situation at the Farm School.

M. S. GOODMAN,
Superintendent.

Report of the Superintendent of Sugar-Cane Experiments.

Weather.—The rainfall for the year was an average one, but during the early part of the reaping season continual showers were experienced in some of the sugar-cane areas which delayed reaping and made it very difficult. These continual showers also affected the cane juice and although adding considerably to the tonnage of cane per acre increased the tonnage of cane per ton of sugar. Owing to the good season experienced during the growing period of the cane and the introduction of new varieties of cane the island made a record crop of sugar. As a result of the good season the young plant canes for the 1935 crop looked very promising but during June, July and August a severe drought was experienced which will probably affect the crop to be reaped in that year.

Varieties.—B.H. 10/12 is still considered by the cane farmer as the most suitable variety from a tonnage milling and juice standpoint and its ratooning qualities are far better than any other varieties on those soils which are suitable for its growth and development and as Jamaica is a ratooning country this cane will always have superiority over the other varieties until a better ratooning cane and general purpose cane can be obtained.

The P.O.J. varieties 2878, 2727 and 2725 have almost entirely replaced the Uba cane in those districts where Mosaic Disease is prevalent. These varieties are commercially immune to Mosaic Disease and are also easier to reap, handle and mill than the Uba.

P.O.J. 2878, has given very good tonnages over wide areas but it will only replace the standard cane B.H. 10/12 in those districts where it is difficult to control Mosaic Disease. This cane has given good tonnages as ratoons in some areas.

P.O.J. 2727 has clearly demonstrated that it is a cane that is hard to be beaten on a poor soil and low rainfall. It is a better cane under these conditions than Uba and is much easier to reap. Under good rainfall and good soil conditions this cane grows vigorously and at reaping it is found that a large percentage of the cane has rotted and the juice is generally poor.

P.O.J. 2725, although being planted extensively in some of the cane areas, is being gradually discarded in others on account of poor ratooning.

The variety E.K. 28 was previously planted in Vere only, on the alluvial soils where it gave good tonnage and juice but it is being tried out in several of the other cane areas under similar soil conditions. On this class of soil ratooning extends over many years and it will be interesting to see if it will ratoon as long as the B.H. 10/12. It will be interesting to note here that on some of these soils last year the B.H. 10/12 fifth ratoons and over gave over 40 tons per acre.

The S. C. 12/4 is only planted on a small scale in places where it ratoons well. A bad feature about this variety is that it is very susceptible to Mosaic Disease and is not a good ratooner.

B. 726 is being planted out on a very small scale on estates in nearly all the cane areas.

Maturing of Varieties.—It has often been brought to the notice of the Department by planters that they are discarding certain varieties because their ratoons did not come up to expectation. On enquiry being made it has, in nearly every instance, been found that the fault is not due to the variety being a poor ratooner but the real cause has been that early-maturing varieties which should have been reaped early were left over until nearly the end of the reaping season. It has been the experience every where that over matured canes when cut do not ratoon as well as those which are cut at the right period of maturity. It is almost impossible to expect early-maturing canes when cut late in the reaping season to ratoon satisfactorily. For guidance I give below a list of the varieties which mature early or otherwise.

Early Maturing.

P.O.J. 2878
P.O.J. 2725
B. 726
S. C. 12/4

Mid-Season.

P.O.J. 2727
E.K. 28

Late.

B.H. 10/12

Manurial and Other Experiments.—Manurial experiments were reaped at the following places:—Georgia, Friendship, Frome, Morelands, Worthy Park, Swanswick, Richmond, Serge Island, Long Pond Llandovery, one experiment each; Hampden and Gray's Inn, two each. The results of these will be given in the report of the Agricultural Chemist.

Manurial experiments were laid down on the following estates:—Georgia, Long Pond, Gray's Inn, Duckenfield, York, Hampden, Swanswick.

Varietal experiments for early and late reaping were laid down on the following estates:—Belleisle, Hye Hall and Jamaica Sugar Estates, Ltd.

Cultivation.—Two Gyrotillers, other than the two mentioned in last year's Report, have been imported and are doing good work, and the parties to whom they belong are pleased with the results that they are getting. The machine completes the entire cultivation of a field ready for planting at a much lower cost than any other mechanical or animal form of cultivation. Although the price of sugar is low it is pleasing to record that planters are not neglecting their cultivation but realise that their only salvation is maximum production of cane per acre.

Extension.—During the year an increased acreage has been prepared for cane in some of the districts and these will be reaped in 1936. If the seasons are favourable the crop to be reaped in 1936 should exceed all previous ones. On Beverley Estate the owner is putting all energy into reclaiming a swamp of extensive area for planting sugar-cane. A pump capable of pumping 1,200 gallons of water a minute has been erected. If this adventure succeeds the owner will have achieved a great success.

Diseases.—Mosaic Disease was prevalent in many districts during the rainy season but most planters persisted in rogueing to keep this disease under control. Some planters, instead of fighting the disease in the B.H. 10/12 which is susceptible to the above disease, are giving way and planting the better commercially immune varieties.

Root Disease was very noticeable on some estates this year and planters should pay more attention to replanting from well-established nurseries or plant canes and not resort to old ratoon fields for planting material.

Eye Spot was prevalent again this year in certain areas.

Insect Pests.—The Moth Borer was in evidence on several estates but the damage done was not to a great extent. Planters are controlling it by cutting out dead hearts.

Sugar-cane Aphis was noticeable on two estates but the only varieties attacked were the B.H. 10/12 and B. 726.

Tours.—A tour was made to the sugar estates on the eastern and northern sides of the Island with Dr. A. E. S. McIntosh, B.Sc., Ph.D., Geneticist of the Central Cane Breeding Station in Barbados. Dr. McIntosh met the planters and discussed with them problems with reference to breeding varieties of cane suitable for their districts as nearly every cane growing district in Jamaica varies both in soil and climate.

Visits.—Periodical visits were made to the sugar estates during the year. Planters look forward to these visits when the merits of the cane varieties grown by them on their different soils are discussed and information is given with regard to the results obtained from varieties grown on other estates similar in soil and climate. These visits have been of great benefit both to the planters and to the Department.

Special visits have also been made at the request of planters to investigate various troubles that occur to them and the necessary advice given in the matter. Planters, when in Kingston, also visit this office to discuss matters of interest to them but which do not necessitate a special visit of investigation to the estate.

Committee Meetings.—In April I attended a meeting of the Advisory Committee on the Sugar Industry.

M. S. GOODMAN,
Superintendent Sugar-Cane Experiments.

Report of the Superintendent of Agriculture.

1. I have the honour to submit this my Annual Report for 1934.
2. During the year I was attached to the Agricultural Chemistry Division of the Department.
3. I supervised the laying out and reaping of the Manurial Experiments being carried out by the Agricultural Chemist on the economic crops. The details of these experiments are embodied in the report of the Agricultural Chemist.
4. When not engaged in work in the field, I was engaged in Analytical work of the soil laboratory. This part of my work is also included in the report of the Agricultural Chemist.
5. I submitted reports on the agricultural possibilities of the areas through which it was proposed to build roads. I also reported on the condition of certain Government lands. An investigation was made on the Small Farmer's Cane Industry in one section of the Island.

(Sgd.) R. S. MARTINEZ,
Superintendent of Agriculture.

IV.—DISEASES OF ANIMALS AND PLANTS.

Report of Government Veterinary Surgeon.

GENERAL OBSERVATIONS.

1. The weather and feeding conditions for livestock during 1934 were generally most favourable, because of an above-average and well distributed rainfall.

The average rainfall for the whole Island was 79.82 inches, which was 5.95 ins. in excess of the 60-year average. The mean of rainy days was 139 days, an excess of 17 over the 33-year average.

The rainfall in the first six months was 16% above the 60-year average, but only 2% above in the second half. Most of 16% increase fell in February, March and April—usually the droughty season of the year.

2. The depression in the Meat and Dairy Industries reported in my 1933 Annual Report has continued, and generally speaking the livestock men are discouraged and pessimistic.

Although the pastoral possibilities of the Island generally are good, in fact, excellent in many parishes, both these branches of the livestock business continue to stagnate.

The fundamental causes for this unfortunate state of affairs are chiefly lack of (i) sound breeding practice, (ii) modern and centralized methods of slaughtering with facilities for processing meats and utilizing its by-products, (iii) central creameries and market milk collecting and distributing depots (iv) and a healthy co-operative spirit among the parties concerned.

The sales and prices of meat and dairy products have also been adversely affected by the continuance of much unemployment and the competitive pressure of imported meats and dairy products and their substitutes.

The following summary taken from the Trade Report of the Colony for year ended 31st December, 1933, is the average annual quantity and value of the chief animal products imported into the Island.

Article.	Quantity.	Valuation.
Condensed Milk	5½ million lbs. approx.	£132,369
Meat as canned, salted beef and pork, ham etc.	2½ million lbs. approx.	£77,797
	8 1-6 million lbs. approx.	£210,164

An average annual importation of animal husbandry products, exclusive of butter, lard, butter and lard substitutes, of approximately 8 1-6 millions pounds weight and £210,164 annual value.

These figures certainly indicate that there is good reason and ample opportunity for much development and co-operative effort in the livestock industry of the Island.

As result of representations by the interests involved and resolution of the Legislative Council, the Government has appointed two separate committees—one for the beef, the other for the dairy industry—to investigate and recommend measures for their improvement and salvation. These Committees had not yet reported at the end of the year.

3. No further attempts were made during the year to discover a foreign market for our surplus beef. As stated last year, a study in 1933 of the possibilities of Trinidad as an outlet were definitely discouraging for a trade in live cattle, because of freight charges, etc. and, further, it appears that the chilled meat market of that colony is already pre-empted by Argentine meats.

4. There is prospect of a small foreign trade in mules. In the six years ending 1934, 573 mules (chiefly pack-mules) valued at £8,451 were exported, i.e. 95-6 per annum of £1,408 approx. value. They were consigned to the Republics of Panama and Spanish Honduras exclusively.

Additional markets are available in

(i) Trinidad, where in the last six years an average of 120 Kentucky mules costing \$200—\$220 a head have been imported annually.

(ii) British Guiana and Barbadoes—the former imports American mules.

(iii) Central American countries other than Panama and Spanish Honduras.

This possible foreign market and the local demand of the Public Works Department and the plantations suggest the possibility of a revival of mule-breeding in the Island. However, it will need much improvement in breeding and feeding operations, if it is to be successful and maintained.

In a tour last August with a purchasing Committee of the Public Works Department, 226 mules offered for sale were inspected. Generally speaking the majority were too small and light for P.W.D. draught work and many were, in addition, of very poor type and undesirable conformation.

Since the advent of the motor car in 1910-15, and the motor truck later, horse and mule breeding has steadily declined in quantity and quality particularly. Much lost ground will have to be regained especially in regard to the type of mares, before a desirable standard of ponies and mules is obtained. St. Elizabeth still remains the best parish for mules and country saddle horses.

5. Baby chicks.

The small experimental importations of pure-bred chicks by aeroplane from U.S.A. (chiefly Miami, Florida) in 1932 were so satisfactory that the business increased in 1933 and advanced considerably in 1934.

1932.	1933.	1934.
A few experimental lots.	2,883 chicks.	13,570 chicks (91 consignments)

The popular breeds are Rhode Island Reds, Leghorns, (White and Brown) and Barred Plymouth Rocks.

These importations will undoubtedly improve the poultry of the Island, which generally are of light weight and low egg-production.

GOVERNMENT FARM SCHOOL AT HOPE.

During the three terms of the year I have continued to lecture to the three classes of students on veterinary science according to the curriculum, namely three periods of 2 hours for each class weekly.

In addition I utilised clinical cases and post mortem material for demonstration; and whenever possible took groups of students to outside properties to enlarge their experience in veterinary matters.

GOVERNMENT STOCK FARM AT HOPE.

Weather conditions on the Farm throughout the year were splendid for the livestock. Instead of the usual droughty conditions of the first six months (particularly from January-April), there was some fall of rain in each month. The two lowest records were—January (1.78 inches with 12 rainy days) and April (2.03 inches with 14 rainy days). The best monthly falls were in February (3.72 inches in 17 days) and May (3.10 inches in 12 days). Total rainfall for the six months 14.19 inches with 75 rainy days with best diurnal falls of 1.37 inches on June 20th and 1.84 on March 13th.

In the second six months the weather was even more favourable, for 41.98 inches rain fell in 71 days with greatest fall of 3.90 inches on 6th September.

At no time in the year was there a real drought or a detrimental spell of wet weather. January with 1.78 inches in 12 days and July with 1.6 inches in 7 days were really the only dry months in the year.

As result of such a well distributed rainfall, pasture grazing was more abundant than usual, and this, with the good growth of sugar cane (the principal fodder of the Farm) and the normal supply of concentrates fed with the cane, carried the herd easily through the year without drawing to any extent upon the stores of ensilage (Guinea corn)—drought reserve fodder.

The general health of the livestock throughout the year was good, except for the recurrence of tuberculosis in the dairy herd as discovered in the June tuberculin test and a sub-acute outbreak of fowl cholera (B. avisepticus Pasteurella avicida) among the poultry, and gastro-intestinal disorders in pail-reared calves.

Veterinary work on the Farm

Supervision and attendance on the horses, mules, cattle and poultry of the Farm and Gardens (Hope and King's House) were maintained throughout the year.

Horses and Mules.

Two mules, Bud and Lotus, were treated for deep nail wounds of the hoof, one mare (MayBee) for acute tendonitis of flexor tendons of front limbs, one mule for subcoronary abscess, and a mare (May) and a mule (Pharoah) for galls and pressure cysts of the back and shoulder.

CATTLE.

1. *Tuberculosis.*

Two tuberculin tests of all the cattle on the Farm were made during the year June 15-22 and November 19-27:

(i) of June 15-22 Test: (Single Subcaudal Intradermal Test). 407 head of Farm-owned cattle consisting of 18 bulls (9 pure-breds and 9 cross-breds), 57 pure-bred cows, 283 grade cows and heifers, 16 working steers and 43 calves: 14 reactors.

8 head of other ownership, viz.:—

4 cows, 3 heifers, 1 calf: no reactors.

In this test there were *nine* additional "suspects," which were retested by the double intradermal method—June 19-22, and again July 24-28 with negative results in all cases, except one heifer (Lad's Betty) which reacted to the 2nd retest (July 24-28) probably from incipient infection and is included in the 14 reactors above.

The disclosure of the test with 14 reactors (3.4%) was very disappointing, because the herd had passed virtually clean tests annually since 1930—only one reactor (0.28%) being found in the December test of 1931.

The physical condition of one of the reactors (Jersey cow, Geranium) suggested generalized tuberculosis, and on being killed and autopsied the suspicion was fully confirmed: lesions of various ages were found in both retro-pharyngeal glands, right lung, bronchial and mediastinal glands, liver, hepatic glands, throughout the length of the intestines with involvement of the mesenteric glands, and gross infection of the uterus. This last explains the infection also found in her calf, Gladys, under 2 months of age which reacted to the test and showed lesions at autopsy in the left retro-pharyngeal, anterior and posterior mediastinal and hepatic glands.

Memo. of reactors:—

5 Pure-bred Jersey cows, Geranium, Hope Gem, Peri lustre Pogistine, Sophie.

1 Pure-bred Guernsey cow, Floret.

2 Pure-bred Red Polls: Teddy's Betty (cow) and Lad's Betty (heifer).

3 Grade Jersey cows: Ffine, Myrtle, Quantum.

1 Grade Guernsey cow: Shine.

1 Grade Holstein heifer: Gloria.

1 Jersey calf, Gladys (under 2 months old) out of reactor, Geranium.

14 head: 11 cows 2 heifers 1 calf.

Twelve of these cases (including the calf with congenital infection) had intimate stable contact, and thirteen yard and drinking trough contact with cow, Geranium—a generalized and open case of the disease. Four of the reactors (Geranium, Hope Gem, Sophie and Geranium's calf, Gladys) were killed and autopsied on the Farm. Gross lesions were found in all four except one, Hope Gem. The other ten animals being in good physical condition were sold subject to passing municipal meat inspection.

(ii) The second tuberculin test (single subcaudal intradermal) of the year, made November, 19-27, 1934, was strongly indicated as necessary by the surprising condition of the herd as revealed by the first test (June 15-22). The testing of the dry and in-milk cows, composing the actual group furnishing or about to furnish milk for public use, was done in co-operation with Mr. G. O. Rushie Grey, Veterinarian to the Kingston and St. Andrew Corporation.

Memo.

Cattle tested.	Reactors.	Suspects.
401 head: Farm-owned cattle, viz.:		
20 bulls (16 adults and 4 short yearlings)		
181 cows, 170 heifers, 16 working steers,	7 reactors	5 suspects
14 calves.		
4 head of other ownership, viz.:		
2 cows, 1 heifer and 1 calf.	Nil.	Nil.
Result: 7 reactors of 401 Farm cattle (1.74%). Others: nil.		
All 7 reactors and 5 suspects were re-tested by the ophthalmic method, November 26-27, and the results obtained confirmed the positive reactions of the 7 reactors to the intradermal method, but failed to incriminate any of the 5 suspects.		
Memo. of reactors:—		
2 pure-bred Jersey cows: Glen's Ethelstine and Victor's Ethelstine.		
2 pure-bred Red Poll cows: Hope Flighty 3rd and Lad's Beta.		
1 grade Red Poll cow: Tedco.		
2 grade Jersey cows: Vickie C., Monica 16th.		

Total 7 head: 7 cows: nil heifers: nil calves.

All the reactors, except Glen's Ethelstine in advanced gestation, were with the approval of the Kingston and St. Andrew Corporation's Veterinarian sold to a butcher, subject to inspection at slaughter.

Four of the seven reactors, namely, the pure-bred Jerseys, Glen's Ethelstine and Victor's Ethelstine, and the pure-bred Red Polls, Hope Flighty 3rd and Lad's Beta, had been up to the first test of the year, (June 15-22) closely associated with the generalized and open case of that test, Jersey cow, Geranium, already reviewed. The others had had general farm contacts and associations with the 14 reactors prior to the June 15-22 test.

The following table shows the incidence of tuberculosis at the Farm for the eight years, 1927-34 inclusive.

Month of Test.	Number Tested.	Result.	Percentage Infection.
January 1927 ..	359 head	20 reactors	5.56%
July, 1927 ..	303 head	1 reactor	0.33%
December, 1927 ..	312 head	1 reactor	0.32%
November, 1928 ..	297 head	1 reactor	0.33%
October, 1929 ..	342 head	1 reactor	0.29%
August and Oct. 1930 ..	326 head	No reactors	Nil.
December, 1931 ..	348 head	1 reactor	0.28%
June, 1932 ..	227 head	No reactors	0%
June, 1933 ..	293 head	No reactors	0%
1934			
(i) June 15-22 ..	407 head	14 reactors	3.4%
(ii) Nov. 19-27 ..	401 head	7 reactors	1.74%

2. Infectious Bovine Abortion (*Bang's Disease*).

No changes in the methods of dealing with this infection were made or were possible during the year.

It is not practicable at present to segregate the infected from the non-infected subjects on the basis of periodic agglutination tests. Accordingly, constant care and vigilance against the dissemination of gross infection were maintained as in past years. All cases of abnormal parturition or actual abortion were isolated for a month or more and treated by antiseptic douching during their isolation.

The incidence of actual abortions and still-births in the year was very low as may be seen from the following table:—

Parturition and Abortion Record 1928-34.

Year.	Full Time Births.	Still Births.	Abortions.
1928 ..	94	2	5
1929 ..	81	2	8
1930 ..	118	4	4
1931 ..	126	..	9
1932 ..	127	1	9
1933 ..	144	4	7
1934 ..	148	6	nil.

3 Tick Fever (*Piroplasmosis bigeminum*).

Regular dipping of all the live stock on the Farm (horses, mules and cattle) was carried on throughout the year. Weather conditions for effectual dipping were good. In 1933 the incessant rains of the latter six months militated definitely against the tick-killing properties of the dipping tank fluid for on many occasions the heavy rain would wash off the arsenite of the dipping fluid from the cattle's skin and hair coat before it could have any effect on the ticks.

The weather in 1933 is probably, in part at least, responsible for the two outbreaks of tick-fever recorded for that year—one in late October, the other in early December involving 21 cases: 7 acutely and 14 mildly.

Cases of 1934.

- | | |
|--------------------------|--|
| (i) Imported cattle. | Nil. |
| (ii) Native-born cattle. | 1 case: purebred Red Poll cow, Panama's Betty: died 18.2.34. |

4. Blackleg. (*Colstridium chauvei*).

No cases for the year.

The annual vaccination of all cattle of susceptible age (i.e. up to 30 months approximately) as instituted in 1927, was performed.

Vaccination record of 1934.

April 6th ..	42 head with aggressin.
May 1st ..	75 head with aggressin.
May 10th ..	10 head with aggressin.

127 head: all the susceptibles of that period or season.

5. Actinomycosis.

In past years sporadic cases (very few in number and confined to the jaws or tongue) have occurred.

In 1934 one case was observed: Holstein heifer, Doreen. Infection through a barbed wire cut on the lower jaw. Treated with local injections of tinctura iodi mitis and full doses of potassium iodide internally and intermittently February 27th-March 31st with permanent recovery.

6. *Mastitis.*

In every dairy herd this appears an inevitable disease in some form.

Record:

Year.	Number of Cases.	Animals.
1931	6	
1932	4	Lydeo, Prosa 2nd (twice) Diva 15th
1933	3	Quaggle, Matilda 13th, Wye 3rd
1934	4	Florence, Lad's Brisk, Perfume, Diva 15th

Efforts are made to limit the spread of infection by keeping affected subjects together as a stable group, milking them last and training milkers disinfect their hands, but this protective scheme is not always assiduously practised.

7. *Obstetrical cases.* 8 cases.

- (i) Severe dystokia requiring assistance. 2 cases: Monica 16th, Quack.
- (ii) Eversion of uterus: 2 cases: Monica 16th, Solita.
- (iii) Retention of foetal membranes: 4 cases: Monica 16th, Paste 1st, Daisy, Cowslip.

8. *Gastro-Intestinal Diseases*—13 severe cases.

Subjects were all young calves (usually under 2 months old) and young heifers (2-4 months old).

In the younger group the chief cause was pail-fed milk, eating coarse vegetable fibre (such as sugar cane, coarse hay, etc.) too early in life: in the older group colic from sour sugar cane.

9. *Interdigital necrosis* (*B. necrophorus*?) or "Fouls."

3 cases only.

The absence of continuous wet weather in the year as contrasted with weeks of continuous rain in 1933 most favourably affected the incidence of this troublesome condition.

Cases in 1933—13

Cases in 1934—3.

10. *Respiratory Diseases.*

Pneumonia: 2 cases, Florence's cow calf and Peralia (heifer).

11. *Accidents.*

- 4 cases:—1 Strangulation in stanchion. Heifer, Perhaps 1st.
- 2 Drowning in dipping tank: Patch's calf with abscessed ear.
- 3 Grade Holstein bull, Romeo. fracture of right fore cannon in a fight.
- 4 Red Poll calf, Tendring Letty. dislocation of neck in stanchion.

12. *Minor Ailments.*

- (i) Superficial sores, stakes, injuries, etc. 40 cases.
- (ii) Abscess 4 cases.
- (iii) Foot injuries and diseases other than "fouls" 6 cases.

50 cases.

13. *Summarized Deaths of Cattle.*

(i) Bulls.	Cows.	Steers.	Heifers.	Calves.	Total.
Nil.	5	Nil.	2	15	22

(ii) Causes of death:—

5 cows: 1. Red Poll, Panama's Betty, of tick fever.

2. Rosette 8th: Killed: ruptured rear flexor tendons.

3-5 killed: Geranium, Hope Gem, Sophie—tuberculosis.

2 heifers: 1. Perhaps 1st: strangulation in stanchion.

2. Fragrance 2nd: gastro-enteritis with bloody discharges.

15 calves:

1. Patch's by drowning in dipping tank.

2. Red Poll, Tendring Letty—dislocation of neck in stanchion.

3. Florence's C. C.—pneumonia.

4. Spook's B.C.—jaundice.

5. Geranium's C. C.—Killed for tuberculosis.

6-12. Seven from gastro-enteritis: Colleen 2nd, Brush, Lusty, Malina, Ruth 2nd, Vamp's C.C., Pigeon 4th.

13. Sherry's C. C—joint-ill (killed)

14. Pusette's B.C.—congenital weakness (killed)

15. Garter's C.C.—deformity of spine (killed)

14 *Poultry.*

(i) Deaths and Causes.

Disease.	Birds.
Food poisoning (botulism?)	Hen No. 134
Peritonitis from ruptured ovisacs	Hens No. 16, No. 36, No. 104, No. 27.
Obstruction of oviduct.	Hens No. 124, No. VC70.
Obesity	Hen No. 62.
Impaction of crop	Hens VC 4, No. 175.
Puncture of abdomen (peritonitis)	Hen No. 57
Acute Hemorrhagic Septicaemia (Cholera)	Hens VC101, No. 129.
Undetermined	Pullets No. 169, No. 180.
Ruptured Portal Vein.	Pullet No. 159.

Total 16 birds.

(ii) Fowl Cholera (Haemorrhagic Septicaemia) was diagnosed in the flock April 22-23 by autopsy of Hens VC 101, and No. 129, and confirmed by bacteriologic examination.

Promptly thereafter (April 24th) all the birds over 3 months of age (57 birds: 9 cocks, 33 hens, 2 cockerels, 13 pullets) were vaccinated with Hemorrhagic Septicaemia Aggressin, and the runs and houses disinfected. This very effectually stopped the mortality from this cause for the remainder of the year.

Government Stud Farm at Grove Place.

Weather conditions during the year were exceptionally good for the pastures and thereby for the live-stock. Their health generally was good.

Rainfall:—January-June 43.19 inches with 21 rainy weeks. July-December 40.30 inches with 24 rainy weeks. Total 83.49 inches with 45 rainy weeks.

Usually Grove Place is extremely dry in January, February, March and the first 2-3 weeks in April. Consequently the rainfall of 1934 in these months (Jan. 1.31 ins., February 13.83 ins., March 6.01 ins. April 5.73 ins. total 26.88 ins.) will long be remembered.

January and December with 1.31 ins. and 1.77 ins. respectively, were the driest months, and March and October the wettest with 13.83 ins. in 4 rainy weeks and 12.40 ins. in 4 rainy weeks respectively.

Veterinary Services.

1. Official Visits.—

Official visits were made January 23rd, March 3rd, 11th, 28th, May 3rd, 4th, 15th, August 9th, September 7th, 30th, October 16th, November 3rd, 12 visits in the year.

2. Veterinary Cases and Observations.—

Mane Stock:

(i) Psoroptic Mange.

The problem of psoroptic mange continued to engage attention throughout the year. The farm mane stock living in pastures and receiving less regular grooming than the stabled sires have always been the troublesome factor in the situation. These animals have been repeatedly treated and virtually cured, but re-infection or recrudescence in the most susceptible (the brood mares) is frequently experienced, and is in large measure traceable to contact (indirect in most instances) with mares arriving at the stud with mange, although patrons are warned that mange-infected animals will not be received.

It has not been possible so far to rigidly enforce this reasonable requirement of admission, because psoroptic mange under the misnomer of "hair lice" has been so long prevalent in the Island and is supinely accepted by stockmen generally as being virtually incurable. Accordingly mildly affected cases are admitted, then isolated and treated, but severe cases are immediately returned to their owners.

Lime-Sulphur Wash has proven more effective as treatment at Grove Place than Paranaph baths without or without sodium arsenite, 40% Tobacco Extract (Black Leaf 40) or Cooper's Cattle Dip.

(ii) Miscellaneous diseases:—

(a) Native jack, Ben, abscessation of near fore-foot from a stake in March: recovered.

(b) Prophylactic tetanus antitoxin given to stallion "Snow Boy," natives jacks, "Ben of Grove," and "Grove Johnny" and working mules, Bill, Cherry, Bell in May.

(c) Gelding Prinnie (3½ year old)—very poor type animal which should have been destroyed as a colt—killed when suffering from deep abscess of the back and mange.

CATTLE.

(i) *Tuberculosis.*—Since 1927 triennial intradermal tuberculin testing has been conducted on all the Farm cattle. No reactors have been discovered by these tests (see table).

No test was made in 1934 on the triennial scheme, but a test in 1935 is proposed in view of the increasing number of visiting untested cows which come to the stud from all parts of the Island.

Date.	Number Tested.	Result.
November, 1924	214	All Negative
April, 1927	420	"
July, 1930	162	"
July, 1933	150	"

(ii) *Blackleg (Clostridium Chauvei)*—Cases of 1934. Cattle: nil: Sheep: 3 ewes (probably.)

Certain pastures of the Farm as known by experience to be infected. Accordingly annual vaccination as a protection has become essential and is regularly done.

The mortality of ewes reported below (death list) probably resulted from this disease. No autopsies were possible by me personally, but when Ewe No. 4 died suddenly on 14.10.34 with a suggestive swelling under the jaw, I thereupon suspected blackleg infection, and had all 11 sheep on the Farm (6 Farm and 5 visiting ewes) vaccinated with blackleg aggressin on 20.10.34. Since then no further deaths of sheep occurred in the year.

Record of Vaccination (Blackleg Aggressin).

Month.	Number of Animals.
May 8-9	62 young cattle
October 20th	7 calves born after May 9. 11 sheep.
Total	69 cattle: 11 sheep.

(iii) *Tick Fever*.—Regular dipping for ticks was maintained during the year, but the high rainfall (83.49 ins. with 45 rainy weeks) naturally reduced its efficacy to some extent.

One of the constant difficulties in tick control at Grove Place is the constant re-infestation of the lands by the admission of tick-infested mares and cows to the stud. On arrival all mares and cows are isolated and treated or dipped before being assigned to their runs. This is a helpful but not an absolutely effective method of protection for the Farm.

FEVER CASES.

Improved Red Poll Bull, Leona's True Lad and native cow, Patsy, were treated for chronic tick fever with trypan blue on March 11th with beneficial effects.

SHEEP AND GOATS.

(i) *Goats*.—The experience with the goat project reported in my 1933 Report was so disastrous and discouraging that the revival of the project in a modified form, as therein stated, has been abandoned, at least, for the present.

(ii) *Sheep*.—The Farm purchased 5 ewes from Font Hill, St. Elizabeth, in the early part of 1934 to run with the imported Suffolk ram, Tendring Token (landed from England in November, 1932).

Between July and October, 3 of these died probably from blackleg, as already mentioned.

The Suffolk ram suffered during the year from:—

1. Parasitic diarrhoea and anaemia in March.

2. Haematoma of both ears in May.

3. Foot rot (*B. necrophorus*?) with sub-coronary infection during September and October. He closed the year in fair health and vigour.

(iii) *Swine*.—The pigs kept well during the year although exposed to disease by the admission of sows to the stud boars.

There were 3 litters of pigs—22 in number, 14 boars, 8 gilts). Six (4 boars, 2 gilts) were lain upon in the farrowing nests and died.

3. BIRTH LIST.

Horses.—Three foals from 5 mares served in 1933.

Date.	Dam.	Foal.	Sex.	Remarks.
16.1.34	Herodias	Hypatia	Filly	
3.2.34	Gloriosa	Skiboy	Colt	Destroyed 28.3.34 fractured leg from a kick.
30.5.34	Lemonade	Frozen Habit	Colt	

Mules.—Two droppings (3 cubs) from 3 mares of 1933.

19.2.34	Simonette	Simple 2nd.	Male cub.	
11.4.34	Santa	Still-born twin cubs	Males	Still-birth of twins

Asses.—Two cubs from 2 jennets served in 1933.

16.4.34	Dapple by Kentucky Boy	Dick	Male	
	Caroline by Ben of Grove	Kada	Male	Destroyed 21.1.35

Cattle.—35 calves from 77 breeding cows and heifers of week-ending 6.1.34 as follows:—

January-June 7 bull calves 8 cow calves—15.

July-December 10 bull calves 10 cow calves—20.

17 bull calves 18 cow calves—35.

Sheep.—2 lambs from 5 ewes on 27.7.34 and 11.12.34.

Swine.—3 litters comprising 22 pigs (14 boars, 8 gilts).

DEATH LIST AND CAUSES.

	Horses.	Mules.	Bulls.	Cows.	Calves.	Sheep.	Swine.
Jan.-July	1 colt	nil	nil	1	nil	nil	nil
July-Dec.	1 gelding	nil	nil	2	3	3 ewes	6 pigs
	2	nil	nil	3	3	3	6

CAUSES.

Horses. (i) Colt Skibo:: born 3.3.34 kicked on 28.3.34 by mare, Lemonade, with fracture of foreleg. Destroyed.

(ii) Gelding, Prinnie: destroyed because of extreme emaciation associated with abscessed back, mange and congenital unthriftness,

CATTLE.

- Cows*.—1. Polly from post-parturient complications. 2. Mirth: choked by an orange.
3. Zilla: acute indigestion with staggers.
Calves.—1. Venetia's B.C.—progressive emaciation.
2. Constance's —destroyed as unthrifty.
3. Goldie's cow calf—congenital weakness.
Sheep.—Ewes No. 5, No. 4, No. 3 on 31.7.34. 14.10.34 and 18.10.34—probably blackleg. (bacillus chauvei) infection.
Pigs.—Six young pigs (4 boars, 2 gilts)—crushed in farrowing nests.

SERVICES IN OTHER GOVERNMENT DEPARTMENTS.

1. *Public Works Department.*

- (i) Stony Hill (St. Andrew)—4 visits—January 6th, 19th, 20th and February 1st to treat foot diseases of horses and mules.
(ii) Mandeville and Mile Gully, Manchester. General inspection with recommendations re "ineffectives" and shoeing (May 4-5).
(iii) Halfway Tree (St. Andrew).
(a) Investigation and preliminary measures resulting in acquisition of a pasture in north-west portion of King's House lands for the mules (June).
(b) Autopsy at King's House pasture of a mule in P.W.D. pasture: later found to be a trespasser: abdominal hernia: 3.12.34.
(c) Treated mule, Dixie, for galled back and infected left shoulder.
(d) Physicking 6 run-down mules (November-December).
(iv) Spanish Town. Attended and destroyed mule, Bimbo, 7.8.34, because of septic fracture of near hock.
(v) Old Harbour—Treated mule, Neville, for cyst of withers, and mule, Harold, for sinus infection.
(vi) Accompanied Mule Purchasing Committee on tour (August 28—September 2) Inspected 226 mules, 9 horses and purchased 56 mules and 5 horses.

2. *Lunatic Asylum, Kingston Medical Department.*

3 visits to castrate and dock lambs with Farm School students. (March—April).

3. *Prisons Department.*

- (i) Survey for condemnation of St. Catherine District Prison mule, Aaron—aged and useless, 7.8.34.
(ii) Treated pony and mules at General Penitentiary for chronic conjunctivitis 26.9.34.

Notifiable Diseases under Law 29 of 1922—"The Contagious Diseases Animals' (Inland) Law, 1922.

As in the past all reported outbreaks or suspected outbreaks of these diseases in 1934 were promptly investigated.

Reports investigated in 1934:—

Disease.	Date.	Location.	Result of Investigation.
1. Anthrax	1. 18.2.34	Crawle (Caymanas Estates Ltd.) St. Catherine.	Definitely not anthrax. Suspected arsenic poisoning.
	2. 17.7.34	Phoenix Park, St. Ann ..	Unconfirmed; some evidence of tick fever.
	3. 3.11.34	Greenvale nr. Newport, Manchester	Tick Fever.
	4. 6.12.34	Joseph Grant's, St. John's Road, St. Catherine.	Hemorrhagic enteritis
	5. 13.12.34 and		
	6. 28.12.34	Maverly (St. Andrew)	Unconfirmed—no evidence.

Six suspected outbreaks; none confirmed.

2. Foot and Mouth Disease	1. 21.9.34	Montpelier, St. James ..	Tenderness of feet and hoofs from wet weather.
	2. 3.10.34	Brompton, St. Elizabeth	No affected animals found.
	3. 14.11.34	Johnson Pen, nr. Duncans, Trelawny.	Mycotic stomatitis.
	3 suspected outbreaks; none confirmed.		

3. Other notifiable diseases—no reports or known occurrences.

Non-Notifiable Diseases.

(i) *Tick Fever* (Piroplasmosis bigeminum).—Occurrences:—

- Hope Farm—1 case with death 18.2.34.
- Levenvale, St. Andrew—1 case with recovery.
- Cedar Valley, St. Ann: 14 head affected—6 deaths, 8 recoveries.
- Woodstock, Westmoreland, Aug. 30th—September 26th. 81 heads affected—45 deaths, 36 recoveries.
- Grandvale, Westmoreland, Sept. 29. A newly imported Poll Angus Bull. Recovered by prompt trypan blue treatment.
- Harmony Hall, Duncans, Trelawny: 6 heads affected—2 deaths, 4 recoveries.

Six occurrences. 106 head attacked—53 died.

In occurrences, No. 5, 3, 4, there is evidence that some of the cattle were very susceptible, because they had been reared virtually tick-free by regular dipping on the property. The outbreaks followed very early after trespassing ticky-cattle had entered their clean pastures and infested them with ticks.

It is very difficult to satisfactorily employ trypan blue as a curative agent on large pens, for often the affected cattle are in an advanced stage of the fever before they are discovered.

(ii) *Blackleg*.—The Department does not usually investigate reports or outbreaks of this disease. It is very general in the moist hill lands of the Island, but stockmen generally employ seasonable vaccination as a preventive and with good results.

Only one specific outbreak at and in the neighbourhood of John Barnett's at Adelphi, St. James, was investigated.

Cremation of the carcasses and vaccination was employed to check it.

(iii) *Stomach worms of cattle* (*Haemonchus contortus*)—This parasitism is very prevalent in many districts (chiefly wet areas) and, although not causing much mortality generally, it is one of the commonest causes for lack of thrift and growth of the young cattle as well as sheep.

Outbreaks at Potosi, St. Thomas, and Mountain Spring, Hanover, were investigated and treatment with copper sulphate inaugurated.

(iv) *Tetanus* was diagnosed among peasant's donkeys in Red Hills, St. Andrew, in July. (July 28th). Some 8-10 head died in succession in a small valley. Infection was traceable to foot injuries from sharp stones and projecting rocks in their pastures or on the roads. It suddenly ceased spontaneously. The owners could not afford antitoxin treatment.

(v) "*Creeps*" in Cattle. (mineral deficiency) was observed in a small group at a residence near Constant Spring (St. Andrew).

Three adult cows were severely affected with general stiffness of the limbs, shortened gait, inclination to lie down inordinately and to rise with difficulty. Generally the whole group was unthrifty. The fodder is obtained from the rain-washed sand hills behind Constant Spring. A combination of bone meal, blood flour and iron sulphate improved their condition.

TICK CONTROL AND DIPPING TANK INSPECTIONS, LAW 41 OF 1920.

1. Other duties make systematic inspections impossible. Control work is suffering as result with detriment to the live stock and amenities of the Island.

2. Between August 9-13 besides doing other things the tanks on 12 properties, viz. Grove Place, Greenvale and Oxford, Grandvale, Font Hill, Hodges, Luana, Battersea, Kendal, Martin's Hill, Marshall's Pen and Retford, were inspected.

3. Generally the tanks are *not* being kept in good order and the dipping fluid is *not* maintained at standard tick-killing strength. It should not be concluded from this observation that the stockmen have become absolutely indifferent or negligent in the control of ticks, but the whole project has been and is in need of constant supervision and stimulus to obtain more zealous and systematic execution.

4. The number of dipping tanks registered in the Department and the annual sales for use therein of paranaph and arsenite of soda from the Government. Laboratory at Hope indicate to some extent the present status of this beneficial programme of work.

(ii) Number of Registered Dipping Tanks by years.

1928.	1929.	1930.	1931.	1932.	1933.	1934.
305	329	341	351	362	368	372

Several of these, however, are known to be in such bad condition that they are useless.

(iii) Sales of Paranaph and Arsenite of Soda.

Lbs.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.
Paranaph	..	29,954	37,353	37,840	33,572	36,770	34,965	39,850
Sodium								33,373
Arsenite	..	17,475	21,900	21,725	20,175	25,499	22,021	24,818
								20,300

INSPECTION OF IMPORTED AND EXPORTED ANIMALS.

(i) Importations inspected under Law 24 of 1890, etc.

Racehorses.	Saddle Horses.	Bulls.	Dogs.
50	1	2	20

(ii) Export certificates—seven covering.

1. 76 mules to Spanish Honduras 15.2.34.
2. 75 mules to Spanish Honduras 1.3.34.
3. 1 dog to England 13.3.34.
4. 1 dog to England 6.4.34.
5. 1 mare to England 5.6.34.
6. 1 Zebu bull to El Salto, Nicaragua 11.7.34.
7. 1 dog to England. 3.10.34.

(Sgd.) S. LOCKETT, V.M.D.,
Gov't. Veterinary Surgeon.
April 18th 1935.

REPORT ON FOUL BROOD (AMERICAN) DISEASE OF BEES, NOVEMBER-DECEMBER, 1934.

Introduction and Origin.

As previously recorded in the 1926-1928 Annual Reports of the Department of Science and Agriculture American Foul Brood of Bees (*Bacillus larvae*) first occurred in the area of Kingston and Lower St. Andrew in 1918, and was apparently eradicated by the prompt incineration of all apiaries (infected and non-infected) within a radius of 2-3 miles of the Parish Church of Kingston.

In spite of such wholesale and drastic measures, it reappeared eight years later in the early part of July, 1926. At the inception of this outbreak the true entity of the disease was not definitely established, but suppressive measures for its control were carried on under the caption of "Four Mile Brood Disease," so named, because it was first found at an apiary at the Four Mile District on the Kingston-Spanish Town Main Road. Later and by courtesy of the Bureau of Entomology of the United States Department of Agriculture, the disease was definitely diagnosed as American Foul Brood of Bees (*Bacillus larvae*).

Governmental control with quarantine restrictions were strictly enforced from the beginning of the outbreak and maintained for 21 months, that is, until March 31st 1928.—nine full months after the declared infected area (Kingston and the whole of St. Andrew) had ceased to show any apiary infection.

As history still repeats itself, the Third Occurrence of this Disease appeared in September-November, 1934, eight years after the former outbreak. No claim, however, is thereby made for any periodic or cyclic recurrence. As was the case in 1926, (dated officially as of early July), the present outbreak of 1934, while dated officially as of November 13th, 1934, appears in reality to be of an earlier date, probably the middle of September.

The outbreak, (at least during September, October and early November) was complicated by the more or less seasonable existence of sacbrood (pickled-brood) in several apiaries, especially in the Windward Road area of Kingston and a small number of apiaries along the Molyneux Road in St. Andrew. When this condition of the apiaries was reviewed by the appropriate Committee of the J.A.S. on October 23rd, they were satisfied from the statements submitted that the disease was Sacbrood (Pickled Brood)—a disease of more or less seasonable and periodic occurrence, and curable by proper apiary management, and not notifiable under the Law (Law 9 of 1918). Accordingly the matter was given publicity in the Press and bee-keepers advised to be watchful of their apiaries and be careful that sacbrood was not mistaken for foul brood, as the two diseases are alike in some respects. Early thereafter (October 26th) the Department made a preliminary investigation and, from the information obtained and the material submitted for examination, concluded that the apiaries in the above-mentioned districts were affected with sacbrood.

In view of this incidence of sacbrood disease in some parts of Kingston and St. Andrew, as already indicated, the Instructor of the Society was detailed to pay special attention to the involved area, and to advise apiarists how best to deal with their sacbrood-affected colonies.

In the course of his duties he discovered definite evidence of Foul Brood in two apiaries in Kingston on November 3rd and November 10-11th respectively, and so reported to the Department on November 12th. His diagnosis was confirmed officially by the Department as American Foul Brood on the following day (November 13th) and promptly thereafter The Protection from Disease (Bees) (Foul Brood) Order, 1934, was made by the Governor under Law 9 of 1918 on November 15th and published in Gazette Extraordinary of November 15th, 1934. Accordingly this date is the official beginning of the outbreak of 1934. However, subsequent events tend to indicate that the infection really existed in September in an apiary where imported queens had recently been introduced. On the other hand there is no substantial proof that the infection found and reported in two apiaries on November 12th is traceable to the apiary which exhibited infection in September.

Whilst some suspicion may reasonably be attached to the importation of foreign queens, the possibility and probability of a "carried-over" infection from the 1926-27 outbreak cannot be entirely disregarded. When once introduced or established in a country or area, foul brood (both American and European types) are rarely absolutely eradicated; more frequently such infections come to stay and be a constant menace to the Bee Industry unless persistently suppressed by drastic measures.

Measures of Control.

Under powers of The Protection from Disease (Bees) (Foul Brood) Order 1934 as gazetted in Gazette Extraordinary of November 15th, 1934, all apiarists within the Island were required among other things to register within seven days in the Department of Agriculture their names and the site and number of hives of bees in their care or possession. Three inspectors ("persons appointed under the Law") were detailed to field work, and confined their attention principally to the then-known-affected area, namely Kingston and St. Andrew, but they also investigated several apiaries in other parishes as circumstances demanded.

Up to the end of the year (31.12.34).

(i) 31 apiarists in Kingston and St. Andrew managing 35 apiaries in the area containing 1,149 colonies were registered.

(ii) 55 apiarists in the other 12 parishes managing 78 apiaries consisting of some 6,193 colonies had registered.

(iii) No infected apiaries were reported or discovered in any of the parishes other than Kingston and St. Andrew.

(iv) Only ten of the 35 apiaries listed in the affected area and consisting of some 364 colonies showed infection.

(v) In eight of these ten infected apiaries all of the infected colonies (29 in number) had been destroyed (burnt after gassing with cyanogas in most cases) by the end of the year.

In the other two apiaries the owners had not absolutely conformed with Regulations, but had attempted suppression of infection by burning a few colonies in toto (probably grossly infected ones) and only affected combs in other cases.

(vi) The year closed with good prospects that the outbreak would be successfully suppressed by maintenance of regulatory measures and the co-operation of the beekeepers.

(vii) During this period the field work was carried on by Messrs. H. H. Coote, Henry S. Holt, S. A. Hibbert and the Government Veterinary Surgeon as "persons" appointed under the Law" (Law 9 of 1918) and directly responsible to the Director of Agriculture.

(Sgd.) S. LOCKETT,
Government Veterinary Surgeon.
April 16, 1935.

ADVISORY COMMITTEE ON THE BANANA and CITRUS INDUSTRIES.

Report of the Secretary for 1934.

The membership of the Committee at the beginning of the year was:—

Chairman:—Director of Agriculture.

Secretary:—Government Microbiologist.

Members:

Hon. J. H. McPhail, Hon. T. J. Cawley

Hon. K. V. Abendana, Messrs. F. A. Cory

G. J. Goble, G. G. R. Sharp, P. Lindo

M. O. V. French-Mullen, G. A. Hawkins

H. Braham, and the Secretary of the Jamaica Agricultural Society.

The Honourable J. H. McPhail tendered his resignation during the year and the Honourable D. T. Wint was appointed to fill the vacancy. The Committee recorded its appreciation of the services of Mr. McPhail during his eleven years membership and their regret at his resignation.

2. The Supervising Inspector of Plant Diseases attended all meetings and the Entomologist, Geneticist and Agricultural Chemist attended on special occasions.

3. The Secretary was on leave for seven months and Mr. W. H. Edwards, Entomologist, acted as Secretary during that time.

4. One meeting was held at the Department of Agriculture but the Committee held a meeting at Hampstead after touring the parish of St. Mary and it also attended a public meeting in St. Mary which was convened by the Custos.

5. As usual, routine matters were dealt with by circulated papers, only the more important issues being reserved for the agenda of meetings.

6. Recommendations were made to Government which resulted in a vote of £1,000 being given by the Legislature to finance an exploration in the East with the object of finding a suitable parasite for the Banana Borer.

7. Recommendations were made concerning the importation of banana suckers for research purposes.

8. The Citrus Development Scheme was considered from time to time and recommendations made for its working.

9. On the advice of the Committee, Government agreed to the Experimental Cold Store being erected in Kingston, close to the wharves and that a small packing house be provided for experimental purposes and with the intention of extending the scope of the work on the lines of a Government Marketing Agency, for vegetables and fruits for which an export market had not yet been developed.

10. The Panama Disease situation in St. Mary was carefully considered and after visiting the parish and meeting the planters, the Committee recommended to Government that a trial of the "one-root" treatment should be permitted for a period of one year, when the situation might be reviewed again. Government accepted the recommendation which was put into effect on July 1, 1934.

11. Records of cases of Panama Disease reported and treated by the Department's officers are given as an Appendix to the Report.

F. E. V. SMITH,
Govt. Microbiologist and Secretary to the Committee.

INCIDENCE OF PANAMA DISEASE IN PARISHES OTHER THAN PORTLAND IN 1934.

Parish.	Total Trees.	Total Plots.	New Cases.	Recurrences.
St. Thomas ..	10,013	6,537	809	5,728
St. Mary ..	144,757	115,767	1,673	114,094
St. Ann ..	7,538	2,861	227	2,634
Trelawny ..	2,511	860	59	801
St. James ..	19,775	6,877	232	6,645
Hanover ..	630	307	52	225
Westmoreland ..	1,275	1,065	63	1,002
St. Elizabeth ..	1,321	50	23	27
Manchester ..	1,200	359	92	267
Clarendon ..	17,624	4,498	184	4,314
St. Catherine ..	22,459	14,552	768	13,784
St. Andrew ..	1,255	444	88	356
Kingston ..	2	1	1	..
Total for 1934 ..	229,170	154,178	4,271 X	149,907 X
Total 1933 ..	141,174	81,406	3,206	78,200
Total 1932 ..	121,722	65,495	3,371	62,124
Total 1931 ..	96,213	55,537	3,102	52,435
Total 1930 ..	73,315	42,141	2,670	39,471
Total 1912 to 1934: (Excluding Portland) ..	741,340	441,691	23,962	417,729

Monthly Totals.

	Total Trees.	Total Plots.	New Cases.	Recurrences.
January ..	18,918	11,109	386	10,723
February ..	16,880	9,481	415	9,066
March ..	16,684	9,420	384	9,036
April ..	15,808	9,386	288	9,098
May ..	20,444	11,457	408	11,049
June ..	15,162	10,997	203	10,794
July ..	14,616	10,681	169	10,512
August ..	14,362	10,942	267	10,675
September ..	17,813	11,938	378	11,560
October ..	23,326	17,156	339	16,817
November ..	24,791	18,527	595	17,932
December ..	30,366	23,084	439	22,645
Total	229,170	154,178	4,271	149,907

PLANT DISEASES.

Report of the Government Microbiologist for 1934.

General.—During the period under review a large proportion of the time of the Microbiologist was occupied in special duties in addition to the maintenance of the routine work connected with Plant Disease. As a member of the Banana Industry Aid Board, it was necessary to attend very frequent meetings during January and February in connection with the consideration of applications for loans by banana planters who had suffered damage from the hurricanes of 1933, and my services were given completely to this work during March and April in order that the work of the Board might be expedited. Although I was seconded for this special work it was possible to maintain the routine advisory work by working in the Laboratory after the usual hours. On June 2nd the Microbiologist proceeded to England on leave, which leave did not expire until after the end of the year. During this period the Government Entomologist, Mr. W. H. Edwards, carried on the work of the Division.

2. *Committees, etc.*—Many meetings of the Banana Industry Aid Board were attended during the earlier months of the year and all the meetings of the Advisory Committee on the Banana and Citrus Industries.

3. *Imperial Mycological Conference.*—I was appointed delegate for Jamaica to this Conference which was held in London during September. Some very valuable discussions took place at this Conference and the benefit of meeting delegates from all over the Empire, and having opportunities of informal discussions with them, proved to be of the greatest usefulness. The general report of the Conference has been published so that it is hardly necessary to go into details of the discussions. I wish to mention, however, the questions of plant quarantine and citrus diseases which provoked some very lively discussions resulting in great usefulness to all concerned. The affairs of the Imperial Mycological Institute were very fully considered by the Conference and it gives great pleasure to record the splendid work and progress which this Institute carried through during the past five years in spite of financial difficulties due to the depression. All delegates were unanimous in their praise of the work of this Institution and the assistance which it renders to the overseas official mycologists.

4. *Plant Diseases.*—(a) *Banana*.—Panama Disease (*Fusarium oxysporum cubense*) The official records of cases treated are given in my Report as Secretary of the Advisory Committee on the Banana and Citrus Industries. While the figures recorded give some indication of the destruction caused by this disease it has to be recorded that the actual loss of land during the year was considerably in excess of that which would be indicated by these statistics. This is due to the fact that so many plantations had become so heavily infected that they no longer proved profitable to cultivate on account of the large number of quarantined plots. In such cases, abandonment of large areas of cultivation became necessary, especially in St. Mary, and the portions of Clarendon, St. Catherine and certain other parishes where inundation by flooded rivers in the previous two years had caused these lands to become infected by material brought down from infected districts in the higher lands. The position in regard to the disease became so acute in St. Mary that the Department and the Advisory Committee took a sympathetic view of the requests of the planters of this parish and advised Government that for a period of one year the planters should be permitted to treat only the diseased tree without destroying the eight surrounding healthy trees. It was stipulated that this relaxation of the full treatment of the disease should last for one year only as an experiment, when results obtained would be considered before any final decision as to the treatment of the disease both in St. Mary and other parishes should be made.

While there were many planters who did not carry out the bargain to the letter and cut down trees without destroying them completely, and while others also attempted to replant highly infected land with susceptible varieties, the experiment appeared up to the end of the year to be proving fairly successful as a salvage measure and in maintaining production temporarily while the work of breeding a satisfactory immune banana was being pushed forward.

(b) *Citrus.*—With the continued interest in this crop, many disease and wastage problems were brought to notice during the year, and while on account of my being seconded for other work during the early part of the year, it was not possible to give as much time as might have been desirable to these problems, yet it was possible to carry out preliminary work on certain lines of control of Blue Mould and related organisms before proceeding on leave.

(c) *Coconuts.*—The leaf disorder which has been causing considerable alarm for a number of years in the parish of St. Mary has, it is pleasing to report, diminished very considerably in intensity during the past year as a result of more favourable climatic conditions. Bud Rot, however, has become far more apparent

than for very many years previously, due to the weakening effect of two hurricanes in two successive years. In the Montego Bay area, a very large number of trees have been lost from a form of Bud Rot in which no active parasite such as *Phytophthora* has been isolated. This area, however, was that in which storm damage in both years was most pronounced. Cases of *Phytophthora* Bud Rot have been much more apparent in the Eastern parishes since the storms.

5. *Agricultural Development Schemes*.—The citrus nursery work has continued under the supervision of Mr. Sutherland, Supervising Inspector of Plant Disease, and the banana breeding work under Mr. Larter, Geneticist. In collaboration with these officers, experimental shipments of seedling bananas and other varieties immune to Panama Disease have been made to the English market and were inspected by the Microbiologist during his leave in England. Special reports have been submitted on these shipments and details, therefore, are not repeated here.

A special investigation into wastage in Jamaican fresh products shipped to the English market was made during the period July to December, 1934, and coupled with this an investigation was made into the possibilities of expanding our export market in England. Special reports have been submitted on these points and have now been published.

F. E. V. SMITH,
Government Microbiologist.

July, 1935.

Report of the Government Entomologist.

I have the honour to submit hereunder my Report for the year 1934 during which period I fulfilled my substantive post of Government Entomologist and also acted as Government Microbiologist as from the beginning of June.

This report records observations on the incidence of the insect pests which called attention during the year as well as remarks on the plant diseases which were observed whilst I was in charge of the Microbiological Division.

1934 can, from the Entomological point of view, be considered as having been on the whole a good year.

No destructive outbreaks of pests attacking major crops has occurred and, mainly on account of fairly well distributed rainfall, outbreaks of army worms and other Lepidopterous pests which usually attain epidemic proportions after periods of drought and which attack the provision crops of small farmers did not occur.

SUGAR CANE.

During the year under review the Sugar Cane Moth Borer, *Diatrea saccharalis* F., has been the object of special attention.

To estimate the losses which the Sugar Industry sustains through the attacks of that pest an extensive survey, rendered possible by the material facilities given by the Director of Agriculture, was conducted on several estates. The incidence of the pest was thus observed under varied environmental conditions as regards soil and climate, type of cultivation and variety of cane. Advantages of those thorough and extensive inspections in the fields was also taken to investigate the relative status of the other pests which attack this crop.

The investigations conducted have yielded interesting results and thrown considerable light on the economic aspect of the problem as it presents itself locally.

The main points can be summarized as follows:

Heavy infestation by *Diatrea saccharalis* occurs but rarely in Jamaica.

Nodal infestation as worked out by examining every node from thousands of stalks taken at the carriers of factories or collected at random in the fields has amounted to 5.54% as average.

Where the heaviest infestations were observed the plants had suffered from hurricanes, were overripe or were growing under conditions distinctly unfavourable to healthy growth. In such fields the canes were usually found simultaneously attacked by the Weevil, *Metamasius serius* (oliv.), by Termites or root diseases.

Degrees of infestation higher than the average cited above were also observed where the soil was very poor or where the canes grown under irrigation, or in swampy lands, had not been thrashed, this having resulted in that the stalks were covered with adventitious roots and fungi holding dry leave stuck to the stalks, frequently along their whole length. The purity of the juice of canes coming from such fields was usually low.

Amongst other interesting facts revealed by that survey is the one that contrarily to what occurs in other countries, the total damage caused by infestations by *Diatrea* in Jamaica remains practically limited to the mechanical destruction of tissue caused by the pest.

During the survey every node where the rind was found having been punctured by a borer was counted as infested. In many cases however, such lesions were insignificant as regards actual destruction of sucrose. It is therefore felt that the figures cited above would give an exaggerated impression of the losses sustained, if they were compared with statistics expressed in similar terms obtained in other countries, and especially from those where the fungus responsible for Red Rot Disease invade the vulnerable internal tissues of cane, whenever these become exposed through wounds caused by borers. The secondary infestations which increase considerably the damages of a mechanical nature caused by the insect was not found to occur to an important extent in Jamaica unless the canes (especially the P.O.J.) varieties, were overripe.

A forcibly rapid survey of another aspect of the problem has shown that the Dipterous parasite of *Diatrea*: *Licetophaga diatrene*, is well distributed over the whole Island. Researches which could elucidate the relative importance of that parasite in comparison with that of the other natural enemies of the Borer and the effect of environmental conditions on their population is a matter for long range research which it is difficult to undertake without adequate assistance and with such a diversity of economic problems to study and to advise on as there is in this Island.

Observations on that subject are however made whenever opportunity for doing so arise, but it would be premature to draw any conclusions at this juncture.

The different varieties of sugar cane cultivated at the Experimental Station are kept under constant observation with a view of detecting any possible intrinsic susceptibility of any new variety before it is propagated.

As in Jamaica, sugar cane is grown under most varied conditions as regards soil, climate and type of cultivation, and as the varieties already under cultivation exist as samples everywhere, investigations as to the relative susceptibility of existing varieties will have to be continued over a number of years before definite conclusions can be drawn.

At the beginning of the year the Weevil Borer; *Metamasius serius* (oliv.) has been considerably more prevalent than usual this being a result of the hurricanes and high winds which, during the previous year had blown down and broken many canes. Removal from fields, which had been reaped, of all stalks liable to carry infestation and their destruction by fire was advised. Normal conditions have subsequently prevailed.

CITRUS.

It is gratifying to note that growers, who, up to a fairly recent past, were giving but little attention to the control of pests and diseases attacking this crop, are making more systematic efforts to achieve that aim.

As most of the fruits reaped come from trees which bear little and grow wild over pasture lands or amongst rank vegetation which afford breeding grounds for pathogenic organisms, the technical advisors of planters are, in Jamaica, frequently faced with almost unsurmountable difficulties when the economic aspect of pest control has to be considered.

Efforts are being continuously made to demonstrate to the growers that the control of pests and diseases is, from the economic point of view, only possible when the general standard of cultivation and the yields consequently obtained warrants the expense; the cost of treatment per tree remaining constant whether it yields a valuable crop or a few fruits of little commercial value.

The policy now adopted by the Department and which consists in providing plants of standard varieties to planters who give reasonable guarantee that such plants will be properly grown in regular groves, is now changing gradually that aspect of the problem and will render control of pests and diseases an economically profitable proposition.

The practice of 'transforming' old citrus trees by cutting their trunk low above ground level and grafting buds thereon, presents among other disadvantages, the drawback that the luxuriant growth produced by those buds are very attractive to aphids and also to the fire ant '*Solenopsis geminata*' which eat the tender bark of the new shoots. The stink bug '*Nezara Viridula*' has also under such conditions revealed itself as being a most destructive pest.

A demonstration on a large scale conducted in the Government nurseries at Caymanas Estate and on the Prison Farm at Spanish Town where '*Solenopsis geminata*' had established itself in enormous numbers, has proved that this pest can, in cultivated groves, be effectively and economically kept under control when all fornicaries as soon as they are detected are treated with a dilute Kerosene-Jeyes-Soap emulsion. In the nurseries mentioned above no difficulties are now encountered from attacks by that pest.

During the drier months of the year the Green Scale '*Coccus viridis*' has in all localities proved very harmful to young plants. Various liquid insecticides and fumigation (under rigid covers or young plants,) were tried during attempts especially aimed at devising a method of control that could be applied against that pest in those mountainous regions where it is physically impossible to carry heavy sprayers and even to obtain water for the preparation of insecticidal sprays. A preparation consisting of a concentrated extract of Pyrethrum diluted with pure Kerosene of light density has been found very effective. The mixture is applied lightly on the plants by means of small hand atomizers.

Mainly through the activities of ants which attend to and carry the Green scales from tree to tree reinfestation of plants which have been sprayed always take place more rapidly in the case of that pest than occurs in the case of other species of Coccids which infest citrus in Jamaica.

As infestation by Green Scales generally remains localized during fairly long times on a limited number of the younger branches before the pest begins to infest the whole foliage and young twigs, by applying the spray mentioned above on all new foci of infestation it is possible to prevent generalized infestation during the periods which elapse between periodical thorough sprayings effected to control all scale insects from a grove. With little attention and at very small extra cost the Officers in charge of the Government Citrus nurseries are now able to keep the plants raised there remarkably free from scale insects.

The Citrus Black Fly is now completely under control over practically the whole Island and this uniquely through the agency of the parasitic wasp '*Eretmocerus serius*' which was introduced in Jamaica about three years ago.

That useful insect has been established in the Government nurseries so that it may be transported on the plants distributed to any locality where it may not already exist.

BANANA.

During the period I acted as Microbiologist I also performed the duties of Secretary of the Advisory Committee of the Banana and Citrus Industry.

As a result of the floods which occurred during the previous year the spread of Panama Disease has progressed to an alarming extent in many parts of the Island.

As from the middle of the year a very important modification have been brought to the method of treating and quarantining cases of the disease in the parish of St. Mary; the results of the new system are now under observation and it is too early to draw conclusions at this stage.

Cosmopolites sordidus, Germar.—More interest in the control of the borer has been evinced by growers and the necessity for the application of measures of field sanitation is being gradually realized.

In the western districts which had suffered from the previous year's hurricane inspections conducted during the early part of 1934 showed that the intensity of infestation had increased to a considerable extent.

This can be directly ascribed to the lamentable state of abandonment in which many plantations have been left after the plants had been blown down by high winds; no attempt having then been immediately made to check the multiplication of the pest which found ideal breeding grounds in the fallen trees left to rot on the ground in the devastated areas. The reasons given in many quarters for that state of abandonment was, that the loans granted for preparing the fields damaged by hurricane became available after the pest had already multiplied in large numbers.

The desirability of undertaking researches that might lead to the discovery of a natural enemy that could be imported in Jamaica to control that pest continues to be very much felt.

COFFEE.

Series of trials have been conducted by this Department with a view of finding a remedy that could, for the control of *Coccus viridis*, be economically applied under the very special conditions met with in the Blue Mountain area.

That scale insect which is the chief enemy of that crop in Jamaica can now be economically controlled on the field scale by means of the insecticide referred to under Citrus.

COCONUT.

The trees which had suffered from adverse climatic conditions during the previous years are now recovering gradually.

The incidence of Bud Rot which had attained epidemic proportions as a result of hurricanes and constant spells of bad weather has now decreased.

With the loyal co-operation of all the Plant Disease Inspectors who had been asked to give very special attention to the problem and to see that all plants found affected are treated without delay, it has been possible to check the spread of that most contagious disease, which in the past have been responsible for the destruction of many coconut groves in many parts of the Island.

In collaboration with the Microbiologist and the Soil Chemist experiments on application of various manures and methods of cultivation as possible remedies to the state of debility exhibited by coconut trees have been started in two localities; on the North and South coast, respectively.

The Shot Hole Borer '*Xyleborus perforans*' and the local Rhinoceros Beetle '*Strategus titanus*' have become common in the groves where trees blown down by hurricanes have been left on the ground to rot.

PIMENTO.

As a result of the constantly humid atmospheric conditions which prevailed during prolonged periods serious outbreaks of a rust (*Hemileia* sp.) occurred in several localities. Though that leaf disease can be controlled by spraying affected plants with a fungicide, such as Bordeaux Mixture, such treatment would be uneconomical in the case of a crop which does not find a profitable market.

The fact that Pimento grows wild, scattered in bush lands, renders the application of treatment almost an impossibility.

That disease has not yet caused the death of plants and there are sound reasons for believing that it will disappear gradually if the exceptionally wet weather which caused its outbreak does not recur in a near future.

TOBACCO.

That crop was kept under close observation during the whole period under review.

Nematodes attacking the roots have proved as destructive to that crop as mosaic disease usually is.

The prevalence of nematodes all over Jamaica especially in the sandy soils and light loams will prove a serious handicap to the development of that industry.

The rudimentary installations for curing and storing the leaves make that heavy losses continue to occur after the crop has been reaped. Leaf spots caused by moulds and uneven curing are frequent causes of low grade products whilst attacks by *Lasioderma sericeicorne* F. is common. Reference to those problems were made in separate reports.

PESTS OF MINOR CROPS AND EXPERIMENTS ON THEIR CONTROL.

Advantage was taken of the trials conducted by the Superintendent of Public Gardens in growing Truck Crops for Export to:

(a) investigate the relative importance of insect pests on the raising of such crops.

(b) experiment with various insecticides for their control so as to find those that would be most suitable for local conditions.

A destructive outbreak of garden cricket '*Gryllus assimilis*' F. occurred in the experimental plots of tomatoes grown at Hope.

The other pests studied have been:

The Fire Ant *Solenopsis geminata* F. attacking garden egg plants in the fields and all kinds of seedlings in the nurseries.

Nezara viridula L. attacking Tomatoes.

The Tomato Fruit Worm *Heliothis obsoleta* F.

The Cabbage Worms *Pieris monuste* Lin. and of *Plutella cruciferarum* Zell.

Margaronia hyalinata L. defoliating melons, cucumbers, pumpkins.

Root Nematodes.

Millipedes,

The Cabbage Aphis: *Mysus persicae*, sulz.

Popular articles on the control of those pests have been written for the Journal of the Jamaica Agricultural Society.

THE FRUIT FLY: *ANASTREPHA LONGIMACUL*, GREENE.

All over the Liguanea plains Bombay mangoes have been found heavily infested by the grubs of this fly.

So long as the mangoes grown for sale are consumed locally or sold to ships in the harbour the extent of the damages done by that pest will, to a great extent, remain unnoticed because those fruits infested by the eggs of the fly or by newly hatched larvae are consumed before decay has started.

When it will be attempted to grow mangoes for export the pest will undoubtedly prove a serious handicap to that industry. Serious attention is therefore being given in anticipation to the problem that will then arise.

Plants bearing fruits which harbour the pest abound over pastures and in woodlands, whilst mango trees growing wild and which bear fruit out of season render efforts aimed at controlling that pest by field sanitation very difficult.

To estimate the intensity of population of those flies during the seasons when cultivated mangoes are not in bearing a number of traps have been kept in various parts of St. Andrew. These have been regularly visited and the annexed graph show the captures made as well as the relative efficiency of the baits experimented with to lure those flies in the traps.

The observations made show that measures of control based on the systematic destruction of all infested fruits will, not, and this on account of the large number of wild hosts which carry the pest in all stages all the year round, yield satisfactory results under existing conditions.

In the absence of an effective natural enemy of that pest its control would have to be conducted on the following lines:

- (a) Eradication of all plants of no economic value which bear fruit serving as host to the pest.
- (b) Trapping of the adults and also their destruction by means of poison baits sprayed on the foliage of plants.
- (c) Systematic destruction of all infested fruits.

MISCELLANEOUS.

With the collaboration of the Secretary of the Jamaica Agricultural Society arrangements have been made so that the Society would develop the sale of insecticides, and of instruments for their application, at prices which would enable small planters to use more insecticides and fungicides for the control of pests and diseases.

During the early part of the year a newly appointed Officer was trained for the inspection of plants and plant products imported in the Island.

The Agricultural Instructors appointed during the year were given a short course of lectures on the main entomological problems with which they are most likely to be confronted and demonstrations on methods of control were made in the fields.

The Half-yearly meeting of the Clarendon Branches of the Jamaica Agricultural Society was attended and a lecture delivered to the members in attendance. A lecture was also delivered and agricultural problems of local interest discussed at a meeting of members of the Agricultural Society held at Bog Walk.

At the request of the Headmaster, the dormitories of the Farm School were fumigated. The Island Record rooms at Spanish Town were fumigated and the Record rooms at Colonial Secretary's Office disinfected and the papers treated against insect attack.

Whilst performing the duties of Government Microbiologist I also served as Secretary of the Advisory Committee on the Banana and Citrus Industry. A public meeting convened by planters at High Gate was attended when the desirability of adopting the one root system was discussed.

A meeting of the Sugar Manufacturers Association was attended and a progress report submitted on the researches conducted with regards to the economic significance to the Sugar Industry of insect pests and diseases as they occur in this Island.

In collaboration with the Agricultural Chemist experiments on the effect of various methods of manuring and of cultivation on coconut trees suffering from a lack of vitality which cannot be ascribed to any known disease or to the effects of infestation by pests have been undertaken into two carefully selected areas where climatic conditions are different.

Investigations were made with regards to the incidence of root infesting nematodes in various parts of the Island. The conditions which make that that pest often reproduces itself in such numbers as to become very destructive to tobacco and to truck crops were studied. The relative susceptibility of crops most commonly grown locally are being observed with the view of utilizing highly infested lands by growing resistant crops. The data being collected will be published for the information of planters.

During this year inspection and fumigation of Citrus Fruit exported to New Zealand has occupied considerable time. As, except in the case of the Citrus Producers Association none of the other shippers possessed adequate arrangements for fumigation in bulk, their fruits had to be fumigated in small lots with the result that the process of emptying and refilling the small rooms in which the fumigation had to be conducted, took considerably more time than was anticipated at first.

Various packers were advised regarding the alterations to be made to their colouring rooms in order that fumigation with hydrocyanic acid gas could be conducted therein. In three cases separate structures built according to specifications have been erected by packers. Fumigation can there be carried out with all necessary safeguards against risks of inadequate ventilation during the handling of the fruits.

The packers who have undertaken to fit their installations with proper arrangements now fully appreciate the advantages derived as they are able to conduct the treatment not only with a minimum of risks, but so rapidly that the process does not materially delay packing by interfering with the ordinary routine in the chain of processes which the fruits undergo.

In spite of the low cost of erection of independent chambers for fumigation (about £20 for a fair size chamber), several packers have not, for economic reasons or on account of the location of their premises, blocked on all sides by other buildings, found it possible to build new structures.

As it was desirable to do the utmost to encourage exports to new markets all facilities were given to conduct fumigation though conditions were not suitable for the use of poisonous gasses unless under exceptional circumstances. Now that such fumigation will not be under the supervision of the technical officers of this Department I am of opinion that the equipments for fumigation should be gradually improved so that by next year all packers desiring to fumigate their fruits should be equipped adequately.

W. H. EDWARDS.

Report of Junior Agricultural Officer.

A.

J. M. McEWEN.

INSPECTION OF IMPORTED PLANT MATERIAL.

I took charge of the inspection of imported plants on May 4th, 1934. The table below gives the details of packages examined from May 4th—December 31st, 1934. For the period September 25th to October 4th, Mr. Miller performed the inspections.

From the U. K. Other Countries.

Packages examined	147	138
Passed after fumigation	110	112
Passed after special treatment	36	4
Destroyed	1	22

During the period it has occasionally been necessary to give special treatment to plants owing to the presence of insect pests or diseases. Whenever the infestation has been serious, or it has been considered that treatment might not be completely effective, the plants have been destroyed. As the regulations have become more widely known there have been fewer cases of the importation of plants from prohibited countries without permits. It was found that some of the exporting firms abroad were neglecting to furnish the certificate required by the permit, or were using a general nursery inspection certificate. The matter was brought to the attention of the firms most commonly dealing with Jamaica, and a marked improvement has resulted. Owing to the fact that there are practically no restrictions on plant importations from the United Kingdom, plants often arrive with large quantities of soil.

In such cases the soil is washed off as thoroughly as possible and delivery is allowed. The washing used to be done either at the King's Warehouse or at the Parcel Post Office but it was found that the large amounts of soil caused blocking of the drains. All such work is now done at the Harbour Master's Office where there is a large open drain with a convenient tap. In the case of large consignments arriving as freight the importer has been required to provide the labour; but in the case of parcels arriving by post it has been necessary for me to hire someone to do the washing, as the consignee very often does not live in Kingston.

<i>Seed Potatoes.</i>				
Barrels	..	..	..	230
Crates	..	..	..	107
Bags	..	..	..	10
Total	..	..	..	347

Of this number 15 barrels and 10 bags were not certified seed, and were therefore not permitted to enter as seed potatoes. Contents of 100 crates were attacked by a fungus disease identified by the Acting Microbiologist as *Rhizoctonia solani*. The importers picked out all the infected tubers as they were advised not to sell them for planting.

Isolated cases of the common potato diseases, scab, *Phytophthora* rot, etc. were seen, but their incidence was not sufficiently great to necessitate reconditioning.

B.

Machinery.—During the period 14 inspections of lots of machinery were performed. The number of pieces in the various lots differed greatly. Any pieces liable to have soil attached or to harbour plant disease organisms were thoroughly disinfected.

C.

Export Certificates.—The following certificates of health were granted:—

General	..	..	..	14
Coffee Seed	..	..	..	7
Coconuts	..	..	..	3

D.

Inspection of Imported Fruit and Vegetables.—The first regular inspection of fruit and vegetables was made by me on June 14th. Prior to this there had been no inspection service. The following table shows the number of packages which arrived between June 14th and December 31st. Representative samples of the products were examined. Mr. Miller acted as Inspector between September 25th and October 4th.

	U. S. A.	Other Countries.
Packages fruits	2,852	154
Packages vegetables	622	3
	3,474	157

Total all Countries—3,631.

REMARKS.

Pests and Diseases.—The most important pests noted were scale insects, especially San Jose scale (*Aspidiotus perniciosus*) which was found in numbers on apples in barrels. Of a total of 137 barrels and 2 baskets of apples found infested with this pest on 12 occasions, 104 barrels and 2 baskets were fumigated and delivered, and 33 barrels were re-exported. One box of peaches showing 15% infestation with 3 species of boring larvae (undetermined) was destroyed. On two occasions large numbers of plums were found to be infested with a small lepidopterous larva (Probably *Anarsia lineatella*). Infested fruit was destroyed. On other occasions single fruits were found infested with various pests, scale insects, codling moth, etc. Such fruits were destroyed. Fungus diseases were not much in evidence, with the exception of the common storage rots. Apply Scab (*Venturia inaequalis*) was seen occasionally.

On the 27th and 29th September Mr. Miller found it necessary to destroy a crate of cabbages and 2 crates of Celery owing to fungoid infections.

Prohibited Fruits.—On three occasions citrus fruits were found and destroyed.

Soil.—Some difficulty was experienced with Celery which came with soil on the roots. A few shipments were refused entry, and since then there has been no trouble in this respect.

E.

From June 5th to December 31st I acted, when not engaged in my duties under the Department, as Assistant to the Secretary of the Jamaica Agricultural Society.

V.—PLANT BREEDING.

Report of the Government Geneticist.

I have the honour to submit hereunder my Report for the year 1934.

1. INTRODUCTION.

The ultimate aim of the banana breeding programme which is now being undertaken by the Department is the raising of varieties of bananas immune to Panama Disease (*Fusarium cubense* E. F. Smith), which will be acceptable to the overseas markets. The common banana of commerce, the Gros Michel, unlike most varieties is highly susceptible to the disease and immune seedlings are being raised by crossing this variety with various immune types such as Robusta, *Musa acuminata*, etc.

The adverse weather conditions of 1932 and 1933 which were responsible for the loss of about 90 per cent. of our growing plants, brought the breeding programme to a temporary standstill and it was not until the end of the latter year that the work began again to approach normality. The year under review, 1934, therefore constitutes a transitional phase in which the supply of new seedlings has been resumed, though of necessity few of these have passed beyond the seed-box stage, and in which the breeding programme has undergone considerable augmentation.

Weather conditions, which have a fundamental bearing on the work, not only with reference to the loss of pollinated bunches, but also in connection with the germination of pollen and setting of seed, have during the year been unusually favourable. 'Northerners' and high winds generally have been few and caused little damage, and the rainfall on most of the pots has been adequate and evenly distributed throughout the year. At Castleton Gardens, which as regards Musa seed is still the most productive area, there was only one week during the year in which no rain fell, and although between November 11th and 17th there were 45.65 inches the damage done was slight.

The curtailment of the breeding during 1933 enabled that time to be devoted to a cytological survey of the breeding plants and the present year has as a result been devoted to the actual breeding and genetical aspects of the problem. In consequence the extent of the breeding plots has been increased from 7½ to 20 acres both by increasing the size of the old plots and incorporating new ones at various times during the year, and a corresponding increase in seed and seedling production has resulted. This increase has not yet attained its maximum as several of the new plots were not started until the latter half of the year and little of their fruit has yet been cut.

2. MUSA CYTOLOGY.

The survey, which was commenced in 1933, of the somatic chromosome numbers of all the banana seedlings and varieties in the Departmental collection has been concluded. For the completion of this study it has only been necessary, owing to improvements in technique, to make a further 35 root-tip fixations to obtain accurate counts of the 32 outstanding varieties. These counts are all in harmony with the conclusions listed in my Report for 1933 which it is unnecessary to repeat here. Further confirmation has been supplied by a continuation of the studies on quantities and variation of pollen produced by the different types of plant and preliminary experiments are being conducted to establish a technique for determining the conditions affecting pollen germination *in vitro* and *in vivo*. The results of this work in so far as they bear on the cytology of the genus as a whole have been compiled for publication in the Journal of Genetics and an account of the cytology of the seedlings and their genesis is in preparation and will be published shortly.

3. BANANA BREEDING.

(i) *General.*—In view of the great setbacks to the breeding work which have occurred in the past as a result of 'Northerners' and storms, which are frequently very localised in this country, it was decided early in the year to increase the number of plots and distribute them in suitable districts within convenient distance of Hope, the headquarters of the Department. With this object five new plots have been

brought into use, plots 2a at Caymanas and 2c at Dawkins which constitute part of the Banana Variety Trials (see below) have been included in the breeding programme and plot 6 at Crawle has been increased in size by four acres. The location and extent of these plots is summarised below.

Breeding Plots.			Acreage	Acreage	New plots
Plot No.	Location.		31.12.33.	31.12.34.	Started.
1a	Castleton I	St. Mary	2.0	2.0	
1b	Castleton II	St. Mary	1.0	1.0	
2a	Caymanas I	St. Catherine	..	2.5	
2b	Caymanas II	St. Catherine	..	1.5	25.4.34
2c	Dawkins	St. Catherine	..	0.75	17.12.34
4b	Coleraine II	St. Mary	2.0	2.0	
4c	Agualta Vale	St. Mary	1.0	1.0	
4d	Orange Hill II	St. Mary	..	3.0	2.8.34
5a	Hope I	St. Andrew	0.25	0.25	
5b	Hope II	St. Andrew	..	1.0	11.5.34
6	Crawle	St. Mary	1.0	5.0	18.2.34
7	Grantham	Clarendon	..	1.0	28.8.34
Total			7.25	21.0	

This extension of the work has resulted in a considerable increase in the number of pollinations carried out during 1934 as compared with previous years, in addition the rate of seed production has also greatly increased. The comparative total pollination figures for the last five years, in so far as they are available, are given in Table I.

TABLE I.

Year.	Pollinations 1930-1934.			
	Bunches Pollinated.	Seed Obtained.	Seed Germinated.	Seedlings Established.
1930	*	*	31	3
1931	127†	5†	35	30
1932	1,379	103	13	6
1933	401	6	1	0
1934	1,472	650	56	(1)
			Prior to 1930	21
			Total	61

In connection with these figures three points need stressing. Firstly, as *Musa* seed remains from 18 to 208 days in the seed box before germinating many of the seed obtained towards the end of the year had by December 31st not been planted sufficiently long. At the time of writing 23 more have germinated which raises the germination rate from 8.61% to 12.31% a figure more comparable with that for 1932 (12.63%). Secondly, the first germination occurred on July 9th and in consequence only one seedling was by the end of the year sufficiently advanced for planting out in the field. There were however 50 healthy seedlings in the seed boxes, 6 seedlings only of the 56 germinations having died in the early stages of growth. Thirdly, of the 1472 bunches pollinated during the year only 773 were cut, 699 being still immature, cutting at Orange Hill II for instance was not commenced until November 14th. On the other hand 111 of the bunches pollinated in 1933 were cut in 1934.

(ii) *Breeding Lines*.—Several alterations in the breeding lines have been made since the commencement of the year. In general, efforts have been concentrated on backcrossing the best tetraploid immune F1 plants (S7, 17, 19) to Gros Michel, in crossing the F1 plants *inter se*, and in raising seedlings from the cross Gros Michel x *Musa acuminata* (Clone B) and all these lines have been extended. In addition a new cross is being undertaken on a large scale namely Gros Michel x *Musa acuminata* (Clone A), of which the Male parent is in several respects superior to the related Clone B.

The cross Gros Michel x Robusta was continued until late into the year but from 270 bunches pollinated during 1933 and 1934 only 4 seed were obtained and none of these germinated; this cross has for the time being been abandoned. Crosses between the F1 and Robusta have also been discontinued on the grounds that the seedlings produced showed insufficient promise. A summary of the various types of pollination carried out is given in Table II. Included in the last column of the table are the seed from bunches pollinated in 1933 and reaped in 1934. The other figures are all pertinent to the year under review.

* No record.

† Records incomplete.

TABLE II.

Summary of Pollinations, 1934.

Cross Female.	Cross Male.	Plots.	Bunches Pollinated.	Bunches Lost.	Bunches Reaped.	Fertile Bunches.	Seed obtained.	
							1934.	1933.
Gros Michel	M. acuminata	7	103	0	0	..	..	..
	Clone A							
"	Clone B.	1a	146	0	95	27	167	11
"	Robusta	4c	106	2	86	2	2	2
"	F1	1a, 2b, 2c, 4c, 4d, 6	613	52	289	4	10	11
F1	Robusta	6	6	0	5	2	2	27
F1	F1	1b, 2a, 4b, 6	456	10	265	34	277	43
Other sterile triploids.	F1	1a	7	0	5	1	1	3
"	M. acuminata							
	Clone B	1a	13	0	12	6	37	0
Sundry	Sundry	1a, 5a, 5b	22	0	16	5	56	1
Total			1,472	64	773	81	552	98
Pollinated in 1933					111			
					884		650	

It should be noted that Gros Michel is a sterile triploid ($2n=33$), *Musa acuminata* a fertile diploid ($2n=22$) and the F1's used in crossing are tetraploid ($2n=44$) and like *M. acuminata* are immune to Panama Disease.

Sufficient data have now been accumulated to yield a preliminary indication of the fertility of the various crosses undertaken, an important consideration in view of the high degree of sterility of much of the breeding material. Table III is computed from figures derived from all the breeding plots and includes all bunches pollinated in 1933 as well as the 1934 pollinations which have been reaped. Column 4 of the table, headed 'Fertile Bunches', represents the number of bunches reaped which have contained any seed. Column 7 gives an indication of the relative seed productivity of the various crosses from the aspect of practical breeding.

TABLE III.

Pollination Results 1933-4.

Cross Female	Cross Male	Bunches reaped.	Fertile bunches.	%	Seed /100		Germination.	% Germination.
					Seed.	pollinated bunches.		
G. M.	M. Acum. B.	137	29	21.17	178	129.9	30	17.54
G. M.	Robusta	270	4	1.48	4	1.5	0	0
G. M.	F. 1	385	11	2.86	21	5.4	3	14.29
G. M.	G. M.	28	1	3.57	1	3.6	0	0
F1	Robusta	21	8	38.09	29	138.1	4	13.79
F1	F1	287	49	17.07	320	111.5	18	5.62*
Other sterile vars.	F1	16	2	12.50	4	25.0	0	0
	M. acum B.	12	6	50.00	37	308.3	1	2.7*
	Robusta	2	0	0	0	0	0	0
Sundry	crosses	16	5	3.12	56	350.0	0	0
Totals		1174	115	9.79	650	55.37	56	8.62

* Few of the seeds from the crosses so marked have been planted sufficiently long to have had a fair chance to germinate.

(iii) *Germination*.—It will be seen from Table III that seed viability is low, the germination percentage rarely exceeding about 15. In consequence experiments have been carried out to test the efficacy of various media and seed box conditions in stimulating growth. Many conditions have been varied, including:

- Media—sand, sterile soil, light loam, heavy clay, agar media, damp filter paper.
- Bright sunlight, shade, darkness.
- Various depths of planting.
- Fresh or desiccated seed.
- Seed of various ages.

f. Seed treatments. e.g. cracking and filing the testa, immersion in sulphuric acid, exposure to temperatures from 5 C to 40 C prior to planting, for various times.

The seed used in all cases was from a single bunch of *M. acuminata* pollinated with a sister (clonal) plant at Hope which yielded 6,188 seed. It was found that the best germination was obtained by planting fresh untreated seed $\frac{1}{8}$ " below the soil surface in good light potting loam in a seed box kept in a warm shady place. The various seed treatments or too deep planting usually resulted in no germination at all,

whereas seed up to six months old appeared to have lost little viability. A marked difference has been noted in the interval between sowing and germination between seed from different crosses. The mean germination period of 41 seed from the cross G.M. x M. *acuminata* was 35.12 days and of 18 seed from the cross F1 x F1 was 76.39 days, over twice as long.

Control of germination and nursery conditions has hitherto been handicapped by the lack of adequate facilities. In December operations were commenced on the erection of a suitable greenhouse at the Government Laboratory, Hope, which will be available for use early in 1935 and will greatly facilitate this branch of the work.

(iv) *Plant Introductions*.—During the year the following importations of *Musa* material for furtherance of the breeding programme have been made under permit and planted in quarantine at Hope.—

Musa Ensete Gmel. Seed. From Department of Agriculture and Protection, Anahuac Colony, Mexico.

Giant Governor. 12 suckers from the Imperial College of Tropical Agriculture, Trinidad.

Palembang

Bande

Guindy

Musa acuminata Clones, C. D, F, G.

'Calcutta 4'

'Calcutta 6'

'Somoa'

2 suckers each from same source as above.

Suckers of the last three are being bulked to provide material for the initiation of three more large scale breeding lines.

4. BANANA VARIETY TRIALS.

Field trials in progress during 1934 are a continuation of trials laid out in 1933, the object of which was to test the reaction of the seedlings to Panama Disease, to determine their possible commercial values, and to apply the latter test to the Highgate and China (Cavendish) varieties. The extent of the trial plots is as follows:—

(a) Seedling.

Plot.		1933.	Acreage. 1934.	
2a	Caymanas I	2.5	2.5	Healthy soil
4a	Coleraine I	3.5	1.25	Soil infected with <i>Fusarium</i> .
4b	Coleraine II	2.0	2.0	" " "
4e	Orange Hill I	..	2.5	" " "
5b	Hope II	..	1.25	Healthy soil
	Total	8.0	9.5	

(b) Highgate.

2c	Dawkins	0.75	0.75
3	Spanish Town	0.5	0.5
	Total	1.25	1.25

(c) Cavendish.

Nonsuch (St. Mary) 2.5, Glengoffe (St. Catherine) 1.0, Borobridge (Clarendon) 1.0, Hope (St. Andrew) 0.5, Coleraine (St. Mary) 2.0, Latiam (St. James) 1.0.

Total 8.0

Two new seedling trial plots were started at Orange Hill and Hope on January 30th and May 11th, respectively. The former of these, which was coming into bearing in December, was designed to replace the 2½ acres at Coleraine which were destroyed by river encroachment in 1933; the latter was established partly as a museum and demonstration plot.

Wind damage necessitated the cutting back of the plants at Caymanas in January just as they were about to shoot, so no plant bunch data are available. The bulk of the first ratoon crop has been reaped and an analysis of the grading and bunch weights is in preparation. A manurial experiment was laid down on this plot in conjunction with the Agricultural Chemist to test the effect of late manuring on bunch size, the results are still incomplete but will probably lack significance.

The Coleraine plots are infected with *Fusarium cubense* and regarding the reaction of the seedlings to Panama disease the conclusions reported in 1933 have been confirmed. The plant and most of the first ratoon crop has been reaped, graded and sample weighed and show a consistent superiority to the crop at Caymanas (which is cultivated under irrigation) as is shown in Table IV.

TABLE IV.
S19 First Ratoons.

Hands Count bunches	Grade of bunches.							Count (9-hand) Bunches.	% Counts.	Mean Bunch Weight.
	11	10	9	8	7	6	5			
	1	1	1	½	½	½	½	Bunches		
Caymanas	0	0	7	62	48	20	11	148	83½	56.7%
Coleraine	1	4	33	33	6	1	0	78	66	84.6%

Three trial shipments of S19 first ratoon bunches have been made to England to investigate carrying and ripening requirements and the fruit has proved readily acceptable to the market.

Trial of the Highgate variety is still in the early stages but present indications are that it should prove a good commercial variety for growing on poor land. It is susceptible to Panama disease.

The Cavendish variety trials have been extended during the year from two to eight acres and several of the plots were shooting bunches by December. Two small experimental shipments have already been made and further ones are planned. An account of all these trial shipments will be found in the Annual Report of the Microbiologist.

In connection with these trials considerable statistical data have been collected in order to establish a basis for the accurate comparison of the various varieties, many of which particularly the seedlings, are difficult to distinguish by appearance alone. It is hoped to publish a separate report of these seedling trials shortly.

I am indebted to the field officers of the Department for assistance in carrying out a search throughout the Island for variant forms of the Gros Michel. So far, five sports of this variety, which have originated locally, are known. During the year three such new varieties have been reported and suckers from the plants in question have been planted at Hope for comparison with the type stock.

5. PAPAW SELECTION.

Trials which were commenced in 1933 to test the reaction of various varieties of papaw (*Carica papaya*) to Mosaic disease, have been continued at Hope. Of 29 different types undergoing test, 25 so far have proved susceptible, one is possibly resistant and tests of three are incomplete. The following varieties are included in this trial:—

S. T. 1-5, 7-11.	supplied by The Superintendent, Spanish Town District Prison,—all susceptible
H. 1, H. 2-3 (Solo)	W. T. Pope, Hawaii Agricultural Experiment Station, Honolulu, Hawaii,
G. 1	The Superintendent, Grove Place Experiment Station.
M. 2	W. Cradwick, Mandeville.
P. 1, 3, 4	J. E. Higgins, Canal Zone Experiment Station, Panama Canal Zone.
P. 2 (Solo)	
"Japan"	U. S. Dept. Agriculture, Washington, U.S.A.
"South Africa"	Dr. S. Lockett, Hope, Jamaica.
"Giant Colombian"	J. B. Sutherland, Halfway Tree, Jamaica
<i>Carica posopora</i>	(3 types) Bath, Jamaica.
<i>Carica sp.</i>	D. Fairchild from Panama Canal Zone. Possibly resistant.
<i>Carica posopora</i> F. G.	Walsingham, Cienfuegos, Cuba.
<i>Carica semianglia</i>	Java.
"Solo"	Java.

Tests of the last three on the list are incomplete.

Infection is left to natural processes as the vector, probably a jassid, apparently abounds on the Liguanea plain. The seriousness of the disease is evidence by the following figures (Table V) which are compiled from observations over a period of two years carried out on 250 plants growing at Spanish Town Prison in St. Catherine.

TABLE V.

Incidence of Papaw Mosaic at Spanish Town.

Date.	Old Healthy Plants.	Supplied in interval.	Total Healthy Plants.	Diseased Plants.	Total Plants.	Died in Interval.	New Cases.	% New cases per month.
0.10.32	250	..	250	..	250	..	..	..
4.4.33	201	0	201	28	229	21	49	3.27
14.8.33	61	11	72	31	103	137	140	17.41
10.10.33	70	101	171	33	204	0	2	1.39
8.1.34	115	47	162	62	224	27	56	10.91
6.3.34	98	35	133	59	192	67	64	19.75
8.6.34	49	9	58	137	195	6	84	21.05
6.9.34	55	0	55	50	105	90	3	1.72
10.12.34	49	0	49	44	93	12	6	3.63
Totals		203				360	404	

In all, 453 papaws have been planted in the two years and of these 404 or 89.2% have become diseased and 360 or 79.5% have died. I am indebted to the Superintendent of Spanish Town Prison for making this material available.

6. MISCELLANEOUS.

A paper entitled 'Chromosome Numbers in the Musaceae' written conjointly with Professor E. E. Cheeseman of the Imperial College of Tropical Agriculture, Trinidad, has been published in the Journal of Genetics Vol. 30. A short paper entitled 'Sports of the Gros Michel' has been published in the Journal of the Jamaica Agricultural Society and a lecture on 'Banana Varieties in Jamaica' was delivered at the Annual Course of Lectures at Hope on July 24th.

One meeting of the Advisory Committee to the Banana and Citrus Industries was attended at the invitation of the Chairman.

Mr. Sutherland has again co-operated in the work reported on above and I am indebted to him for his assistance.

L. N. H. LARTER,
Government Geneticist.
12.2.35.

VI.—AGRICULTURAL EDUCATION AND FIELD SERVICES.

Report of Headmaster Government Farm School, 1934.

I have the honour to submit my Report for the year 1934.

Attendance.—The Government Farm School completed the year with an average attendance of 44 students. The number of students in each of the three years was as follows:

First Year	45 students
Second Year	43 “
Third Year	44 “

The average total enrollment for the past five years has been

1930	57 students
1931	54 “
1932	41 “
1933	47 “
1934	44

While the facilities at the School provide for only 60 students, from the above figures it will be seen that the Institution has been running to only about two-thirds capacity during the last few years. I am however pleased to report that there seems to be a greater interest taken in the School this year and it is expected that the enrollment will show an increase in 1935, as several applications have already been received from boys wishing to take the course offered.

Record of the School.—The School is just about to complete the twenty-fifth year of operation. Reviewing the results the School has produced during that time, it is evident that it has played a very important part in the improvement of agriculture in Jamaica, and graduates are to be found in nearly all the large properties in the Island, as well as in responsible positions in other agricultural colonies. There is ample scope for an institution such as the Farm School in Jamaica, and it is hoped that with the attention now being given to the question of Vocational Training, the School will play an even more important role than it has done in the past.

The usual course of instruction was given during the year, with the exception that Surveying was given to the Second Year students as well as those in the Third Year. The Instructor in Surveying requested that more time be allotted to the subject, as it was not possible to give a detailed course in the six weeks of each term that the Third Years were at Hope. The subject has therefore been made a Second Year Course and students will receive instruction in Surveying over the full twelve weeks of each term.

Graduation.—The Annual Graduation Ceremony was held on July 5th and eleven students were graduated. Those graduated were:

Diplomas in Practical Agriculture.

Wilton Simeon Brown—St. Ann.
 Walter Beresford Dixon—St. Andrew.
 Ernest Johnathan Brinkman Douglas—Kingston.
 Maurice Christie Bailey Hay—St. Ann.
 Austin Hamilton Lawrence—St. Mary.
 Vincent Herbert Lawrence—Clarendon.
 Ralvin Methuselah Little—St. Andrew.
 Linton Theodore McDonnough—St. Ann.
 Lloyd Beresford Robinson—Clarendon.
 Simeon Albert Thompson—Portland.

Certificate in Practical Agriculture.

Thaddeus Theophilus Carby—Portland.

The Acting Colonial Secretary, Mr. W. D. Battershill was present and spoke to the students. The Diplomas and Certificate were presented by the Director of Agriculture, who also presented the prizes. The following is the list of prizes with the winner in each case.

1. For General Proficiency in the Third Year—books to the value of one guinea to be selected by the Student.
 Awarded to E. J. B. Douglas. Average 80%.
2. Prize for the Student doing the best ploughing in the Third Year—books to the value of one guinea to be selected by the Student. Donated by the Director of Agriculture, Hon. A. C. Barnes, Esq.
 Awarded to W. S. Brown.
3. Prize for the Student showing the greatest improvement in cricket during the year.
 A cricket bat donated by M. S. Goodman, Esq.
 Awarded to W. S. Brown.

Employment of Students.—The question of finding employment for the students who graduate is still one which gives some concern. I am however, pleased to report that a number of the students have already found employment in work either agricultural, or connected with agriculture. The openings for employment of graduates of the School are not as plentiful as they might be, but it is expected that as financial conditions improve this difficulty will gradually be overcome.

Sports.—The Annual Sports Day was held at the School on Wednesday, March 28th and was well attended. The Day was a successful one, and the students took a keen interest in all events, which were well contested.

I wish to take this opportunity of thanking those who so generously donated prizes for the various events of the day.

Games and athletics form an important part of the activities at the School. The School entered a team in the Third Division Football Competition and finished fifth out of eleven teams. The School did not enter a cricket team in competition, but a number of matches were played with outside teams. There is a keen interest taken in the game at the School, and it is planned to enter a team in competition next year.

The Annual Old Boys vs. Present Boys Cricket Match was held on June 30th. There was a good attendance of Old Boys, who always take this opportunity of visiting the School. At the Match the first issue of the Old Boys News Letter was distributed.

Grove Place.—The Third Year Students spent half of each term at Grove Place, where they received practical instruction in phases of agricultural work which cannot be given at Hope. The system of having the students spend half of their senior year at Grove Place is working well, and so far has proved most satisfactory. While at Grove Place the students visit holdings, estates and packing houses, in the district from which they derive considerable benefit.

Visits to holdings, estates, etc.—During the year Mr. Powell took the Third Year Students on several trips to the various estates, coffee properties, packing houses, and other places of interest, where the students had an opportunity of seeing the different methods used. The places visited during the year included Hon. J. H. McPhail's citrus grove, Caymanas Estates, Silver Hill Coffee Factory and Plantation, vegetable plots on Liguanea Plains, Jamaica Agricultural Society's Apiary, Jamaica Producers Citrus Packing House and the Doncaster Soap Factory.

I wish to thank the owners of various estates, properties and other places of interest visited by the students, for allowing us the opportunity to show the students the methods used in the various phases of agricultural work.

Health of the Students.—During the year the health of the students was good and no contagious disease was reported. The District Medical Officer at Halfway Tree gave every assistance in assisting in keeping the students in good health.

Repairs to buildings and equipment.—During the year the building used as a library in the past, was renovated and made into a change room for the students. Racks and cupboards were installed, and the students are now able to change without going into the dormitories. This facilitates the work in keeping the dormitories in a tidy condition.

The desks and tables in the class rooms were painted, and the desks numbered, each student being allotted a numbered desk when he returned for the Christmas Term. The location of each bed in the dormitory was also numbered, and spaces allotted to each student.

School Experiment Station.—Work was started in May on the Experiment Station for the School, and the various plots were planted by the students when they returned in September. The School now has an Experiment Station consisting of 4 acres, located adjoining the School grounds, which provides ample space for demonstration work in both major and minor crops. The work of clearing and preparing the land and purchasing banana suckers was financed with £50 secured from the Maintenance Vote from the Experiment Station at Hope Gardens.

At present crops being grown on the Station include tomatoes, cabbage, peppers, cauliflowers, okra, cassava, tobacco, pineapples, sweet potatoes, coffee, cane, bananas, and citrus. The work required for the cultivation of the crops is done by the students, and having the Station located close to the School greatly facilitates practical instruction in Field Crops, as little time is now lost going to and from the Station. The Station is in charge of Mr. L. A. Powell, who gives instruction in Field Crops and who is responsible for getting the Station so well established.

Text Books.—Beginning with the Christmas Term the students in all years were required to purchase text-books in order to supplement the classroom instruction. Standard text-books were recommended, and it has been found that instructional work is made easier, and the amount of work covered is greater than in the past. The books used by the students will be useful to them after they leave School. The books recommended were:

The Principles of Agriculture—Bailey
 Animal Husbandry for Schools—Harper
 Farm and Estate Book-keeping—Fieldhouse
 Chemistry for Agricultural Students—Adie
 Poultry Breeding and Management—Dryden
 Principles of Veterinary Science—Hadley
 Elementary Lectures on Veterinary Science—Thompson
 A Text Book of Tropical Agriculture—Nicholls
 Types and Breeds of Farm Animals—Plumb
 Equipment for the Farm and Farmstead—Ramsower
 Productive Soils—Weir.

Arrangements have been made for these books to be purchased locally.

Student Christian Movement.—Regular meetings of the branch of the Student Christian Movement were held throughout the year. Meetings are held every Sunday morning and I wish to express my thanks to Mr. E. B. Hallett of the Y.M.C.A. for the interest he has taken in this phase of the activities at the School.

Salt beef experiment.—At the request of the Moneague Butchery an experiment was conducted to determine the best method of salting beef for this climate. It has been found that while the market for good cuts of beef remains strong, there is often difficulty of disposing of the cheaper cuts such as the navel, brisket and flank. Work was conducted in testing out six recipes, and it was found that the best method was dry salting, or rubbing the meat in a mixture of salt and saltpetre and allowing it to pickle in its own brine. This produced a product of good quality and colour, and a market for such meat is being developed.

Extension work.—The first Annual Conference of the Officers of the Department of Science and Agriculture was held at the School on January 15th and 16th. The General Classroom was given over for the meeting, and lunch was provided on the first day for those present. At the Conference, the Director appointed the Headmaster to the Agricultural Education, Livestock and Dairying Committees and reports were submitted by the various committees. The total registration for the Conference was 34.

A course of instruction for the newly appointed Agricultural Instructors was put on by the Department from April 3rd to 14th. Arrangements were made for the Instructors, five in number, to board and lodge at the School. Members of the School Staff gave instruction in Animal Husbandry, Poultry and some phases of Field Husbandry during the course.

The Annual Summer Course was held at the Farm School from July 23rd to 28th. The attendance this year showed a considerable increase over the two previous years as the following figures indicate.

Attendance 1932—45
1933—60
1934—89

This course which is put on by the Department, is becoming more popular each year, and provides a means for those interested in agriculture to secure the latest information regarding the developments in the various branches of agriculture.

Members of the Farm School Staff gave instruction in Judging, Management and Breeding of Cattle, Poultry Rearing and Field Crops during the course.

During the year I attended meetings of the Associated Branches of the Jamaica Agricultural Society at Chapelton, Santa Cruz, Bog Walk and Hope. I spoke on the subject of "Small Stock" at three of these meetings. I also acted as judge of the livestock at the Juvenile Agricultural and School Fairs at Marley Hill, Eccleston and Bellas Gate. There appears to be an active interest on the part of the young people in agricultural fairs and I am of the opinion that this branch of extension work can be developed to good advantage.

Mr. L. A. Powell, Agricultural Master at the School acted as judge at the Agricultural Fair at Gilnock, St. Elizabeth in December.

The Associated Branches of the Jamaica Agricultural Society, held their semi-annual meeting at the Farm School in December. Facilities were provided for them to use the dining room for lunch.

Advisory Board Meetings.—The Advisory Board of the Farm School of which the Headmaster is Secretary, held meetings on January 23rd and September 18th at which time matters of interest to the School were discussed.

Conclusion.—The year has been satisfactory for the school and it is quite evident that its sphere can be enlarged. The interest being taken in the activities of the institution augur well for the future, and there appears to be no reason why the School should not play a very important part in the agricultural activities of the Island.

I wish to take this opportunity of expressing my appreciation of the co-operation and assistance rendered to the School by the various members of the Department. I take this opportunity also of thanking the penkeepers and estate owners of the Island, who have so kindly placed their places at our disposal and assisted in demonstrating the proper methods of agriculture to the students. To the Staff of the Farm School and the Staff of the Stock Farm I extend my thanks for their co-operation and willingness to assist at all times in carrying on the work of the institution.

7th February, 1935.

J. W. HOWE,
Headmaster.

Report of Farm Superintendent.

Conditions on the whole were good for livestock raising as the rainfall throughout the year was evenly distributed in the Liguanea Plain and little trouble was encountered from lack of pasture and feed, due to drought. The pasture stood up well, with the result that the stock was in good condition at all times. The production of milk was high and considerable revenue was obtained from the butter which was made. The crop of guinea corn for silage was exceptionally good both as to tonnage and quality, and a good crop of ratoon corn was obtained during December.

Buildings and construction.—During the year considerable construction work was done on the Farm. The most important building erected being the new dairy building containing 100 stanchions. Due to the increase in the milking herd during the last two years some trouble has been felt from the lack of sufficient stable room for the herd. The new building now provides room for 100 animals and is located alongside the previous dairy building of 60 stanchions so that now the dairy herd can all be housed at one time as room for 160 animals is provided.

The 100 stanchion building erected during the year has overall dimensions, including the yard around it of 57 ft. wide by 222 ft. in length. The building itself is 27 ft. wide and 182 ft. long and is divided into four sections each section providing room for 25 cows. The building is patterned after the old 60 stanchion building but some changes and improvements have been made. It is proposed in time to install a litter carrier through the two buildings in order to facilitate cleaning. The 100 stanchion building was erected entirely by labour on the Farm.

In order to improve the results of the poultry work, a new incubator room was erected. The old room which was part of the cow stalls in the Bottom Yard was very unsatisfactory and it is thought that the low hatchability obtained in some cases was due to this. The new incubator room is 10 ft. by 12 ft. and already has justified its erection from the improved results of the recent hatchings.

A wooden irrigation flume was erected from the main dairy buildings to the cane piece adjoining. This piece of cane can now be well irrigated by the washing water from the dairy buildings, and a better yield of cane is expected. This cane piece was planted out during the year.

The roads on the Farm were graded and their general condition improved during the year. Where necessary, gravel was applied which assists materially in keeping them in better shape, especially during the wet weather.

All the signs on the Farm were re-painted during the year and new signs added where necessary.

During the year the Farm truck made a number of trips into the country to deliver citrus plants for the Department Nurseries.

Public Stud Pens.—From time to time application has been made by owners of cows in the districts adjoining Hope for services of the bulls at the Farm. Owing to the possibility of disease it was not possible to comply with the requests. In order however to accommodate these people two pens were erected opposite the main gate of the Farm, on Hope Road, and two good bulls were stationed for public service. The bulls used are "Hope Victor" a purebred Jersey bred on the Farm. This animal is sired by "Sophie 19th's

Victor 63rd" and is out of "*Meridale Perfection*" an imported purebred Jersey cow. This bull is of good type and has sired some good calves. The other bull stationed for public service is "*Fanfare*" a high grade Guernsey sired by "*Foremost's Monogram*" an imported bull which won many prizes in the U.S.A. The dam of "*Fanfare*" is "*Fantom*".

The fee for service is 6s. Twenty-four hours free pasturage is allowed, after which time the rate is 2/6 per day.

The service was commenced in August, and to the end of the year the services totalled 16, to the Jersey bull 10 to the Guernsey 6. It is hoped as this service becomes better known, that the number of cows sent will increase.

Livestock Purchases.—The Jersey bull "*Fon 70A*" was imported from the United States and landed here on February 8th. This bull is from the herd of Mr. E. J. Cornish, Coldspring on the Hudson, New York, and is a particularly good bull for type. The dam of this bull is a cow with a Gold Medal Record and the Farm was fortunate to get such a well bred animal, especially when it is considered that the price paid for him was 350 dollars. That this animal will be a distinct asset to the herd has already been demonstrated by the calves he has so far produced.

The Farm made arrangements to import an American Mammoth Jack for Grove Place from the United States. The jack selected was "*Senator Owen*" and was landed on October 4th in good condition and remained at Hope until December 20th when he was sent to Grove Place. This jack was imported from the Kentucky Jack Farms, of Lexington, Kentucky, U.S.A. and is a good type of animal. He will be standing for service at Grove Place.

One pen of Rhode Island Reds and one pen of White Leghorns were imported through the University of British Columbia, Canada and landed here on November 29th.

The Rhode Island Reds will provide new blood for the flock at the Farm and have so far done well. The Farm made a new departure in importing White Leghorns, as previously only one breed, the Rhode Island Red was kept. As the saturation point for this breed has nearly been reached here, it was thought advisable to import birds of an egg laying breed. As the White Leghorn breed has done well in Jamaica, and as there is a good demand for these birds, it was decided to import a pen of birds of this breed.

In June four mules were purchased from the Government Stud Farm, Grove Place to replace some of the mules on the Stock Farm which will have to be drafted out on account of old age. The mules selected were all by the imported jack "*Kentucky Boy*" and were strong boned, upstanding animals of every good draught type. The mules have been used on the Farm since they arrived and have worked very well.

Rabbits.—The Rockefeller Foundation have in the past found difficulty in obtaining sufficient rabbits for experimental work with yaws, and requested the Farm to raise rabbits for them. Fifteen pairs of common rabbits were purchased, these were later supplemented with some purebred Chinchillas and New Zealand Reds, and the Farm has been supplying the Foundation with rabbits for this important work.

Re-afforestation.—With the heavy rains of 1933 it has become evident that something must be done on the Farm to get the Liguanea Ridge re-afforested in order to prevent erosion. With this idea in mind a request was sent to the Forestry Officer to inspect the Ridge and advise as to the best method of preventing any further loss from washing. The Officer in question visited the area and advised as to the most satisfactory method to follow. Work in this connection will be started as soon as the rainy season commences and it is hoped that in time trees may be established on the Ridge.

Tenants.—A request was received from the tenants on two areas on the Farm asking that they be allowed to purchase the land they now rented. The Superintendent along with the Foreman made an inspection of the land and interviewed the tenants in question. The request to purchase was not granted, but arrangements for a lease of the lands to the tenants is being considered.

Tuberculin test.—The semi-annual tuberculin test was conducted in June with the result that 13 reactors were found in the herd. A further test was made in November and 7 animals re-acted. The herd at the Farm has been free from tuberculosis for the past two years. The infection this year is thought to have been caused by bulls from adjacent properties breaking into the Farm herd.

Record production of cow "Nancy".—What is thought to be a record for milk production for a cow in the West Indies was made by the grade Holstein cow "*Nancy*," a cow bred at the Stock Farm. The cow was 3 years 8 months old when she made her record, and gave a production of 75.8 pounds of milk in one day or 29.15 quarts. The production of this cow over a 30 day period was 1,398 pounds. The sire of this cow is "*Sir Francy Romeo Posch*", the Holstein herd sire at the Farm. Considering that this is the first calf from this cow, it is expected that she will give an even greater production in future lactations.

Silage.—The crop of guinea corn silage this year was especially good due to the even distribution of the rain during the growing season. The tonnage and quality of the corn was superior to that of the last few years, and as the crop was cut at an early stage of maturity, it is expected that the quality of the silage will be good. A total of 359 tons of silage was put up for the year.

An experiment was made in stacking green guinea grass for silage. No silo was used, the grass being cut and stacked similar to the method of stacking hay. The grass has not yet been used so no definite result of the experiment can be stated, but if the method is a success, it will be most valuable to those raising cattle in the drier areas, where there is a large amount of grass during the wet season and a dearth of feed later on.

Native corn.—An attempt was made to use native corn in the rations of the stock and through the Superintendent at Grove Place. 343 bushels were purchased. The corn proved to be an excellent feed but some difficulty was found in storing it. A galvanized granary was imported from Canada for the purpose and proved to be fairly satisfactory. Due to the fact that it was not possible to make it air tight, fumigation against weevils was not as efficient as it should have been with the result that there was some loss.

Seven acres of corn were grown on the Farm and the grain harvested on the cob for feed. Instead of shelling the corn it is to be ground on the cob and fed as corn and cob meal.

Mango crop.—Due to the high winds and heavy rains during the flowering season of the mangoes, the crop this year was smaller than in previous years. The quality was however, good, and ready sale was found for the fruit. A number of experimental shipments were sent to England and arrived for the most part in good condition. The loss in transit was lower than in previous shipments. The prices received for the

fruit were satisfactory and there appears to be a ready market in England for this fruit. Many people on the Liguanea Plain are now raising their own mangoes, it would appear that the Farm will have to dispose of the bulk of its crop by export rather than locally, in the near future.

Sales of stock.—During the year the sales of stock amounted to the following.

Cattle.			
Sold to butcher	40 cows: 6 calves		46
Sold for breeding	47 calves, 10 bulls of breeding age		57
Rabbits.			
Sold			13
Poultry.			
Eggs sold for hatching			205
Eggs sold for table purposes			1884
Cockerels sold for breeding			20
Hens sold for breeding			7
Hens and roosters culled			30

Extension work.—During the year the number of visitors to the Farm increased. A tour party of about 100 persons under the auspices of the Pennsylvania Farmers Magazine (U.S.A.) was conducted over the Farm and the stock shown to them. Arrangements were made for a number of branches of the Jamaica Agricultural Society as well as several parties of school children to tour the Farm. It is encouraging to note that the number of parties making application to tour the Farm is increasing. Such applications are encouraged, and arrangements are made for them accordingly.

Instruction in several phases of livestock work was given to the newly appointed Agricultural Instructors during their course in April. Similar work was conducted during the Summer Course held at the Farm School during July.

Visitors to the Farm included Sir Edward and Lady Davson, His Excellency the Governor and Lady Denham, Lieutenant-Colonel Hayworth-Savage, a prominent Red Poll breeder, Mr. Dossor Massey, Agricultural College, New Zealand, Mr. W. H. Hagley, Department of Agriculture, Grenada, Dr. H. Sosa, Director of Agriculture, Panama, Mr. E. C. Green, Department of Agriculture, Mandated Territory of New Guinea, Mr. M. E. Diaz, Mr. V. Toltenten, Mr. R. A. Myea, all of the Department of Agriculture, San Domingo, and several others.

In conclusion I wish to express my thanks for the co-operation and assistance rendered by the various branches of the Department. My thanks are also due to the staff of the Farm School and the staff of the Stock Farm for the assistance which they have been so willing to give at all times.

J. W. HOWE,
Farm Superintendent.

7th February, 1935.

GENERAL INFORMATION.

Government Stock Farm, 1934.

Livestock.—The table below shows the production of the ten highest cows in the herd for the year 1934.

No.	Name.	Breed.	Age in years.	No. days milked.	Total production	Value		
					lbs.	£	s.	d.
1	Lydite 3rd	Grade Holstein	12	365	9,343	90	3	2
2	Marchioness 3rd	Grade Aryshire	9	334	6,971	67	5	5
3	Norbrook 5th	Grade Jersey	7	331	6,655	64	4	5
4	Teddy's Pretty	Red Poll	7	364	6,257	60	7	7
5	Laurel	Grade Guernsey	7	307	6,215	59	19	6
6	Lily	Grade Guernsey	4	365	6,214	59	19	4
7	October	Brown Swiss	13	314	5,801	55	19	7
8	Baba	Grade Native	7	330	5,778	55	15	2
9	Cognac 2nd	Grade Holstein	12	311	5,496	53	0	9
10	Conora	Grade Guernsey	7	334	5,475	52	16	8

Calvings 1934.

Total 157.

71 Bull calves.

86 Heifer calves.

The milking Herd comprised of the following cows in 1934:—

1st calving	29
2nd	32
3rd	21
4th	19
5th	9
6th	9
7th	8
8th	3
9th	2

The calves were sired by the following bulls:—

	Bull calves.	Heifer calves.
Posch	8	16
Theagenes	8	6
Hope Victor	13	5
Double Folly	2	9
Foremost	7	13
Porpus	8	4
Angelo	2	0
Hope Foremost 3rd	7	12
Norvic	1	3
Colin	2	2
Sassoon	1	4
The Mayor	2	3
Fon 70A	3	4
Pusa	0	1
Unknown	7	4

Bull Calves sold to public:—

1934	51
1933	40
1932	38
1931	32

Sale of Bull calves by breeds 1934:—

Jersey	20
Guernsey	17
Holstein	9
Red Poll	5

Yearling Bulls sold.

10 head.	
Pure Bred Guernsey	1
Grade Guernsey	1
Grade Jersey	1
Montgomery Jersey	2
Montgomery Brown Swiss	4
Grade Holstein	1

Stock sold to butcher.

37 cows and 1 bull.

Non breeders and Old age	21 head	
Reactors to T.B. Rest	16 "	
Bull—old age	1 "	Total 38

Deaths.

24 head	
Cows	5 head
Heifers	1 "
Calves	18 "
Destroyed	9 "
By accident	2 "
Died	11 "
Born dead	2 "

Feed used.

Canes	564 tons
Cotton seed meal	616 bags (100 lbs.)
Linseed meal	240 bags (125 lbs.)
Bran	390 bags (100 lbs.)
Coconut meal	59 tons
Milk powder	50 barrels (200 lbs.) " 10,000 lbs.
Milk powder	50 cases (112 lbs.) " 5,600 lbs.

Milk Yield and Sales.

Yield	254,448.90 qts.	1933	236,391.00 qts.	1932	222,923.00 qts.
Sales	196,971.25 qts.	1933	198,913.25 qts.	1932	186,924.50 qts.

Highest Monthly Production, May 24, 889.70 qts.

Highest Monthly Sales, March 17, 944.75 qts.

Lowest Monthly Production, November 17, 961.00 qts.

Lowest Monthly Sales, June 15, 554.00 qts.

Highest Daily Production, 27.5.34, 865.30 qts.

Highest Daily Sales, 21.12.34, 606.50 qts.

Lowest Daily Production, 2.10.34, 528.70 qts.

Lowest Daily Sales, 1.5.34, 480.75 qts.

Highest No. Cows milked per day, 31.5.34—147.

Lowest No. cows milked per day, 20.9.34—127.

Highest Daily Yield for cow, 9.12.34—75.8 lbs. (Nancy)

Highest Yearly Yield for cow Lydite 3rd, 9,825 lbs. (From 7.12.33 to 7.12.34).

Milk yields shows an increase over previous year of 18,057 quarts.

Milk sales shows a decrease of 1,996 quarts. This decrease is due to the low requisitions from the contractors when the Farm was producing a large amount of milk, and a high demand when the yield was low.

J. W. HOWE,
Farm Superintendent.

HOPE STOCK FARM ACCOUNTS, YEAR ENDED DECEMBER 31, 1934.

RECEIPTS.			DISBURSEMENTS.			BALANCE.		
RECEIPTS.	APPROVED ESTIMATES.	REVISED ESTIMATES.	ACTUAL.	DISBURSEMENTS.	ACTUAL.	APPROVED ESTIMATES.	REVISED ESTIMATES.	ACTUAL.
£ s. d.	£	£	£ s. d.	£ s. d.	£ s. d.	£	£	£ s. d.
Balance on 31.12.33	3,580	3,582	3,582 15 4	Personal Emoluments—	..	112	112	£ s. d.
Milk Sales	4,500	4,650	4,652 18 6	Accountant	..	105	105	105 0 0
Butter Sales	50	214	214 3 9½	Clerk	..	38	38	37 10 0
Live Stock Sales	300	386	421 7 10	Farm Superintendent	..	..	..	..
Poultry Sales	35	36	37 5 0	Contribution to Pension	..	255	255	254 10 0
Rents	180	200	208 8 9	Foreman	..	20	20	19 2 6
Bombay Mango Sales	425	194	193 16 11½	Wages	..	134	134	133 15 0
Pine Sales	2	1	0 6 8	Rent, Comm.	..	1,100	1,300	1,295 16 3
Miscellaneous—	..	..	..	Fruit, Comm.	..	40	40	41 13 8
Interest (Bank)	74 3 0	..	..	Accountant	..	58	26	25 14 0
Truck (Reimbursements)	95 15 7	..	..	Clerk	..	38	38	38 0 0
Food for Stock (Reimbursements)	12 10 11	265	321 13 4	Other Charges—	..	35	35	35 0 0
Refund (Farm School)	4 9 3	..	..	Food for Stock:	..	1,676	1,848	1,843 11 5
Refund Fees	4 16 0	..	..	Growing Canes	..	..	..	123 11 4
Refund Imprest A. F. Thelwell	50 0 0	..	..	Growing Guinea Corn	..	..	..	39 10 3
Sundries	79 18 7	..	..	Growing Seed Corn	..	..	..	14 16 9
	..	..	..	Mfg. Guinea Corn Silage	..	..	..	85 18 1
	..	..	..	Mfg. Grass Silage	..	..	..	14 11 3
	..	..	..	Poultry Feed	..	..	..	31 2 10
	..	..	..	Imported and Other Feeds	..	..	..	1,109 18 5
	150	..	..	Crops—Plantation Pines	..	1,600	1,450	1,419 8 11
	..	..	..	Rearing Calves—At Grove Place	..	25	23	22 12 9
	..	..	..	Clearing and Fencing	..	80	38	37 10 0
	..	..	..	Buildings, Machinery and Equipment:	..	500	530	550 16 9
	..	..	..	Buildings	..	..	..	..
	..	..	..	Machinery	..	..	..	..
	..	..	..	Furniture and Fixtures	..	..	..	..
	..	..	..	Stores and Parts	..	..	..	..
	..	..	..	Vehicles and Harness	..	..	..	..
	..	..	..	Tools and Implements	..	..	..	..
	..	..	..	General Repairs	..	..	..	..
	..	..	..	Miscellaneous:—Purchase of Live stock	..	2,100	2,150	2,056 7 4
	..	..	..	Truck	..	600	605	603 16 6
	..	..	..	Rents: Expenses	..	..	..	..
	..	..	..	Bombay Mangoes Expenses	..	..	..	..
	..	..	..	Butter Expenses	..	..	..	..
	..	..	..	Valuation Expenses	..	..	..	..
	..	..	..	Taxes	..	..	..	..
	..	..	..	Poultry Expenses	..	..	..	..
	..	..	..	Sundries	..	..	..	..
	..	..	..	Balance—	..	650	600	567 18 1
	..	..	..	Bank, Nova Scotia	..	7,231	7,244	7,102 1 9
	..	..	..	Government Savings Bank	..	..	..	2,530 14 5
	..	..	..		..	..	..	9,632 16 2
	..	..	..		..	..	..	..
	..	..	..		..	..	..	..
	..	..	..		..	..	..	..
	..	..	..		..	..	..	..

N. B. DONALDSON Accountant.

A. C. BARNES, Director of Agriculture

Dr.

Dr.	£	s.	d.	£	s.	d.	Cr.
To Depreciation:							
Buildings	92	14	5				3 12 9
Machinery	122	8	6				133 11 10
Furniture and Fixtures	62	19	6				163 9 1
Truck	30	0	0				141 4 6½
Tools and Implements	74	7	6				4,915 3 2
Vehicles and Harness	59	5	0	441	14	11	194 7 2½
							Butter
							Interest (Bank)
							Stud Fees
							Miscellaneous
Repairs and Upkeep:							
Buildings	78	19	8				
Machinery	38	5	10				
Furniture and Fixtures	6	19	6				
Truck	6	14	10				
Tools and Implements	27	9	11				
Vehicles and Harness	171	15	9				
General	365	13	2	695	18	8	
Truck (running expenses)				62	2	6	
Larceny (Tools)				0	17	6	
Food for Stock (consumed)				1,314	18	3	
Plantation (Pines)				22	6	1	
Taxes				13	8	0	
Rearing Calves at Grove Place				26	18	0	
Cleaning and Fencing				553	11	9	
Wages				1,295	16	3	
Accountant				150	0	0	
Clerk				140	0	0	
Foreman				133	15	0	
Farm Superintendent				37	10	0	
Experiments: Guinea Corn Silage				1	3	7	
Contributions to Pension				19	2	6	
Miscellaneous Expenses				260	6	11	
Balance (Net profit for year)				503	2	1	
				£5,677	12	0	£5,677 12 0

A. C. BARNES, Director of Agriculture.

HOPE STOCK FARM YEAR ENDED DECEMBER 31, 1934.

BALANCE SHEET.

<i>Assets.</i>	£ s. d.	£ s. d.	<i>Liabilities.</i>	£ s. d.	£ s. d.
Buildings—			Accounts Payable:		
As at 31.12.33	2,860 9 5		Treasurer for New		
Additions	1,192 3 5		York Agents	..	69 7 7
	4,052 12 10		Current Accounts:		
Depreciation	92 14 5	3,959 18 5	O. W. Harrison	0 1 2	
			Ansley Webster	0 9 0	
Machinery:			Dr. J. Myers	0 0 3	0 10 5
As at 31.12.33	1,332 3 8		Jamaica Government		
Additions	3 18 7		Balance of grant for		
	1,336 2 3		setting up Live Stock	606 6 0	
Depreciation	122 8 6	1,213 13 9	Less paid off during year		
			by supplies to Grove		
Furniture and Fixtures:			Place as follows:		
As at 31.12.33	991 15 2		1 Guernsey		
Additions	116 16 9		Bull 15 0 0		
	1,108 11 11		5 Yearling		
Depreciation	62 19 6	1,045 12 5	Ewes 10 10 0		
			1 Jack 156 10 10	182 0 10	424 5 2
Truck:			Profit and Loss:		
As at 31.12.33	90 0 0		As at 31.3.33	18,137 4 3	
Depreciation	30 0 0	60 0 0	Add profit for the year	503 2 1	18,640 6 4
Tools and Implements:					
As at 31.12.33	224 17 8				
Additions	21 0 7				
	245 18 3				
Depreciation	74 7 6	171 10 9			
Vehicles and Harness:					
As at 31.12.33	309 16 6				
Additions	17 15 0				
	327 11 6				
Depreciation	59 5 0	268 6 6			
Stores and Parts:					
Stock as per Inventory		175 17 8			
Food for Stock:					
Stock as per Inventory		891 0 1			
Plantation:					
1 acre Pines	..	50 0 0			
Live Stock:					
Cattle, Rabbits and					
Horsekind	8,200 10 0				
Poultry	92 6 0	8 292 16 0			
Accounts Receivable:					
Public Hospital	279 17 6				
Tuberculosis Hospital	22 19 5				
Jubilee Hospital	14 10 3				
Lunatic Asylum	123 1 6				
General Penitentiary	19 7 6				
Farm School	3 6 8				
E. Downes	2 8 11				
Rockefeller Foundation	1 4 0				
Govt. Laboratory					
Hope	0 6 8				
O. L. Crichton	0 0 4				
F. E. V. Smith	0 17 0				
P. W. Dept.	1 4 7				
Capt. M. deCordova	0 6 0				
Hope Gardens					
Transport	0 10 0				
Development of Citrus					
Industry, etc.	4 9 2				
Expts. in vegetable					
growing and					
Marketing	0 10 0	474 19 6			
Government Savings Bank					
"Deposit Account"		2,045 4 6			
Bank of Nova Scotia					
"Current Account"		485 9 11			
		£19,134 9 6			19,134 9 6

N. B. DONALDSON,
Accountant.

A. C. BARNES,
Director of Agriculture.

Report of Superintendent of Grove Place Stud Farm and Experimental Station.

I have the honour to submit Report on Grove Place Stud Farm and Experimental Station for 1934.

INTRODUCTION.

Much progress in the general upkeep of the property was effected during the year. Pastures and ranges were cleaned; old walls and fences in disrepair received attention; one new grass piece was established.

As a result the general appearance of the Farm has improved.

The year will go down in history as a poor one for breeding of stock. A large proportion of animals came to the stud feebly and refused to breed.

The demands on a Public Stud Farm are exacting. Patrons would get better result if they were to co-operate by ensuring that cows sent to the bulls have not recently jumped the fence, and mares to the stallion have not long been confirmed non-breeders.

If we are to judge by the large number of visitors to the Farm, and the increased use of the stud animals, it is reasonable to conclude that Grove Place is gaining in popular favour.

A. LIVE STOCK.

1. **STUD SERVICE, Cattle.**—The figures indicate a growing demand for the use of the Stud Bulls. A total of 149 cows from 40 owners were served in 1934 compared with an average of 81 from 25 owners for the previous 5 years.

Cortes,—Montgomery—Guernsey, and Lad,—Red Poll, were the most popular bulls.

Six bulls representing the popular breeds, some with Montgomery blood, others pure-bred, were available for public service during the year. A new bull—Hope's Foremost 5th—Pure-bred Guernsey, was added to the herd in March.

Horsekind. *Snow Boy.*—Snow Boy, the stallion, had a fair share of public patronage—28 visiting and 4 Farm mares (9 Thoroughbreds) compared with an average of 52 for the previous 5 years were served by him.

Due to a fair demand for mules the Jack was more popular than he had been for years.

Snow Boy has kept good health, and has been the object of much admiration.

Kentucky Boy.—This Jack has now completed 14 years at the stud and his age is telling both in his appearance and prowess as a stud animal.

He was bred at Kentucky Jack Farm, U.S.A. foaled in 1916, and imported to Jamaica in 1920.

He has served, in his time at the stud in Jamaica, a total of 2,328 mares and 83 jennets and has left his mark on the mules of the Colony.

A grandson of the Worlds' Champion Jack "Fair Promise" Kentucky Boy was imported at a cost of £338. History will regard him as one of the most noteworthy sires ever brought to the Colony.

During 1934, 29 mares and two jennets were served by him. He will stand to a few selected animals for the last season in 1935.

A young Jack—"Senator Owen"—has been imported at a cost of £156 from the breeders of Kentucky Boy; he gives every promise of being a worthy successor.

Pigs.—This service has remained popular. 37 sows as against 24 the year before, were received for service.

The demand for young pigs is greater than the Farm will be able to overtake for a long time.

A typical native boar has been grown out to help the Imported Boar at service.

This breed—English Berkshires—has proved most suitable for Jamaica conditions of Feed, etc. They thrive well and grow out early both when bred pure and crossed with native pigs.

It is satisfactory that after years of effort by public and private enterprise with many breeds, at last one has been found which appears to suit Jamaica in all respects.

Sheep.—The Suffolk Ram did not keep good health but was available for service throughout the breeding season. Five local ewes were bought. Of these 3 and 2 lambs died.

It is interesting that subsequent to rigorous treatment for internal parasites and also injections with Blackleg Aggressin there were no more losses.

Twenty four ewes, as against 44 last year, were received for service.

Breeders report that lambs sired by the ram give promise of greater thriftiness.

Goats.—This service has been discontinued in view of the unsuitableness of Grove Place for this class of stock.

2. **SALES.**—Two young Jacks—outstanding specimens—sired by Kentucky Boy out of a Mark Hanna jennet, were sold—Grove Ben for 45 guineas to Mr. Arthur McGrath, and Grove Johnny for 40 guineas to Mr. A. L. Calder.

Four upstanding mules were broken to drought and sold for £18 each.

Five boar and 2 shote pigs were sold. The standard price for pigs is £2 for boars, and £1 for shotes, at 8 weeks old on the Farm.

Other sales were: One Thoroughbred filly foal. 11 old and barren cows to the butcher.

One old mule. 18 emasculated calves.

3. **FARM ANIMALS.** *Cattle.*—The herd now consists of 165 head, and represents years of work in grading up. On appearance the animals seem most promising, but as the work has reached the point where further progress is impossible without records, arrangements have been made to start butter-making in the new year.

Three cows and 3 calves died during the year, and 18 bull calves and 17 cow calves were dropped.

Horsekind.—Mane stock on the Farm are as follows: one stallion, two Jacks, 10 mares, 2 ponies, 5 working mules, 4 young mules, 4 jennets, 2 he-cubs.

Two colts, one filly foal, one mule and 2 cubs were foaled during the year.

The older mares are being replaced by mares bred on the Farm, the policy being to renew the breeding gang and concentrate on mule breeding.

Pigs.—The breeding pen consists of 2 boars, 4 sows and two gilts. Twenty-two pigs were farrowed during the year. Unfortunately, despite all precaution and the use of all the known devices the crushings at birth were abnormal—6 out of 22.

Sheep.—Four lambs were dropped. Of these two died. As these were from ewes received in lamb the loss was not great.

These uplands are reputedly poor for sheep-rearing, but in view of their unsuitability for such a number of other agricultural pursuits, the possibility of evolving a breed of sheep suitable to conditions would be a project well worth consideration. The initial attempt at sheep-rearing is no more discouraging than were the pioneer attempts at the acclimatization of imported dairy cattle at Hope Farm.

In view of the expense contingent on sending ewes to the Ram work was directed rather to breeding half-bred rams for sale than to encouraging breeders to send ewes for service.

4. *Valuation.*—All the Farm animals were presented to the Valuator at the end of the year, and valued for £2,353 10s.

Average valuation figures for previous 3 years is £1,924 5s. 8d.

The details are as follows:—

Cattle.	No. Head.	Valuation.		
		£	s.	d.
Bulls and Bull Calves	19	381	0	0
Pedigree Cows and Heifers	3	22	0	0
Native Cows	84	761	0	0
Grade Heifers	39	194	0	0
Cow Calves	16	37	0	0
Steers	4	78	0	0
	165	£1,473	0	0
Horsekind	33	700	0	0
Pigs	17	131	0	0
Sheep	5	34	10	0
Bees, 10 colonies		15	0	0
Grand Total	220	£2,353	10	0

Bees.—An apiary consisting of ten colonies was bought during the year as a further addition to the equipment for Agricultural Education.

4. *Health.*—Save for the sheep, animals maintained good health during the year. The Farm, despite public service for all classes of animals from all over the Island remained free from serious contagious and infectious diseases.

But it is well that attention be directed to the incidence of tick infestation among all classes of animals sent to the Farm service. Cows from every type of owner arrive at the Farm with serious infestation of ticks, and perhaps more serious is the condition of mares. Animals obviously cleaned up for the occasion still carry in their ears, chiefly, a sad story of neglect of treatment for ticks.

Other common forms of neglect in mares are those of the feet, and the die-hard notion of regarding mange as "weather beat," and therefore of no account, still persists.

5. *Public Dipping.*—The tank was available for public dipping at a penny per head throughout the year. 7,925 head were dipped, as against 6,764 in 1933.

B. EXPERIMENTAL STATION.

1. *Citrus Nursery.*—1,221 budded grapefruit and orange plants of standard varieties were distributed at 1/- per plant free at nearest Railway Station. The demand for plants was so great that sale was effected on a ration basis. A new Nursery of Marsh grapefruit, Navel, Parson Brown and Valencia Orange will be ready for distribution early next year.

2. *Banana.*—The plot of Bananas which was blown down in November, 1933 was replanted in January. A manurial Experiment in collaboration with the Agricultural Chemist was undertaken, and a report in this connection will be published in due course.

Returns to date from the plot nine-tenths of an acre in size, 405 plants, show a reaping of 153 nines, 80 eights, 19 sevens, 9 blown down, with a cash sale of £33 18s.

It is important that experience with Banana at Grove Place will apply to the whole of the red limestone belt of the Colony. The experiment is being continued through the ratoon stage.

One main feature has been the use of a continuous "cover" to replace the system of heavy and expensive mulching usually followed in this part of the Island.

3. *Citrus Groves.*—A new plot of 40 budded navel orange was planted out.

A plot of Valencia and Parson Brown oranges on Sour orange and Rough Lemon Stock, respectively, was also planted out.

A new plot of Marsh grapefruit, plants from the Grove Place Nursery, was planted out.

The miscellaneous collection plot has made good growth and should come into bearing in 1935.

Plants of an undesirable variety on Section C have been top-worked to Marsh grapefruit. Due to the exposed situation much difficulty was experienced in this work, but the plants are now growing vigorously and serve as a demonstration to growers with undesirable groves who desire to top-work them to standard varieties.

At present a total of 1,100 budded grapefruit and 280 orange trees are set out in the various sections. Of these 200 grapefruit should come into bearing in 1935.

Old pasture trees yielded cash sales of fruit of the value of £9 5s. 7d.

4. *Coffee.*—The old long-top plant was cleaned and pruned and produced a good crop.

The young short-top plot has recovered from the damage of the hurricane of 1933 and will come into bearing in 1935.

5. *Cover Crops and Green Manure*.—Extensive work in this direction was continued throughout the year, and a record of the work done will be published in due course.

Jerusalem Peas, Cow Peas, and various local and American varieties of Pigeon Peas have been added to the list of those published in last year's report.

Seeds and cuttings of the various "covers" have been distributed.

6. *Potatoes*.—A series of experiments for selection of varieties, cultural technique, manuring and spraying has been started for the Jamaica Agricultural Society. These tests will be continued during 1935 and a report for publication issued in due course.

A series of storage tests along practical lines suited to the district is also under way.

7. *Tomatoes*.—Fourteen varieties were under test for general suitability and late production, but the heavy weather destroyed the experiment.

A later effort sorted out two of the smaller varieties—Kondine Red and Best of All—as showing qualities suited to our conditions and the market. These varieties have shown high resistance to disease and good productivity, and in view of the local re-action to a smaller tomato should find popular favour.

Four semi-wild native varieties have been sorted out and an attempt at crossing these with the above varieties is being made.

8. *Papaw*.—The topped trees have produced vigorously during the year and remained free of Mosaic.

A new Mexican Dwarf variety has been introduced.

9. *Other Crops*.—Pines, Root, Catch and Fodder Crops, Canes and vegetables have been grown for educational work.

10. *Synthetic Manure*.—A pit was constructed, stacked and activated, toward the end of the year; the simpler process of making manure by activated heaps is also being tried out.

11. *General*.—All cultural operations in connection with major and minor crops, as well as operations for the control of pests and diseases were undertaken in connection with Agricultural Educational work.

The Station was a continuous source of interest to visiting planters during the year.

C. AGRICULTURAL EDUCATION.

Two batches of senior Farm School students spent eighteen weeks at Grove Place receiving instruction in general agriculture and stock breeding and rearing, and carrying out definite projects and general work on the Station and Farm.

Six Field Observation Days were undertaken—covering visits to fields, factories, packing houses and Small Settler cultivations.

D. LECTURES.

Lectures were delivered at the following:

Manchester Branches Associated.

Clarendon Branches Associated.

Snowden Branch.

Mile Gully Branch.

In addition lectures and demonstrations were taken with Farm School Students in residence.

E. WEATHER.

Weather conditions throughout the year were nearly ideal for agricultural operations. The total rainfall was 83.39 inches compared with an average of 64.55 for 5 years omitting the abnormal fall in 1934. The precipitation was well distributed there being 118 rain days. For the first time for a number of years the Farm passed through the crucial months from a water point of view, without anxiety.

F. ACKNOWLEDGMENT.

I have to acknowledge active co-operation from other branches and officers of the Department. Hope Farm continues to supply us with stud animals for the Farm, thus relieving General Revenue of this responsibility; Doctor S. Lockett, Veterinarian, continues his vigilant supervision of the health of all animals and answers our numerous calls cheerfully; Hope Gardens continues to meet our voracious demands for plants and seeds; the Agricultural Chemist, Microbiologist and Entomologist enthusiastically co-operate in all schemes of Experimentation and Pest Control.

I have also to acknowledge co-operation from Planters and Factory owners for facilitating students on Field Observation Days, and the officers of the Jamaica Agricultural Society in this and the St. Elizabeth Areas for their assistance with Lectures and travelling of Students.

I have the honour to be,

Sir,

Your obedient servant,

ARTHUR THELWELL,

Superintendent.

Report of the Supervising Inspector of Plant Diseases.

I forward herewith for your information, some important phases of the work carried out under my control for year ending 1934.

Surprise Visits on Inspectors of Plant Diseases were carried out as usual. All complaints from planters were investigated and duly dealt with.

Citrus Nurseries were established and budding to complete the fifteen acres under cultivation was vigorously maintained. The health of the Apprentices was unfavourable at the fall of the year owing to Malarial Fever.

10,366 Budded plants were distributed most of which were planted under the supervision of the Agricultural Officer (who entered the Department in April of last year) or myself. There are now 70,000 budded plants almost ready for distribution. Plants distributed are growing healthily and the death rate is less than 3%.

A special campaign in the planting and advertising of the plants was carried out in the parish of Portland. An Inspector has been especially detailed for the establishment of the Industry in Portland. The Agricultural Officer looks after the establishment in the parish of St. Mary, and collects the money for the plants distributed, and assists in the general distribution of plants.

Supervision of Six Banana Breeding Stations has been kept up regularly. Eight acres of Cavendish bananas were established in six different spots in the Island. Three shipments of both Seedling and Cavendish bananas have been made.

There has been a great demand for the Seedling banana suckers (S. 19) and the total distributed for the year was 2,395. The Highgate variety was propagated and a distribution of 325 suckers was made.

There are three most promising crosses:—S. 95; S. 86; and S. 118, that are now being cultivated to test out immunity from P.D. These varieties carry a stronger leaf-stalk, and one in particular carries a pointed finger-tip.

J. B. SUTHERLAND,
Supervising Inspector of Plant Diseases.

Report of the Agricultural Officer.

I have the honour to submit my report for the nine months of 1934 to December in which I have served the Department.

The specific work to which I have been detailed is the extension of the Citrus Industry. The Nurseries at Dawkins Caymanas, and at Tamarinds, Prison Farm, Spanish Town were already in full swing, and plants of all stages were established there. My first effort was in prospective work particularly in the parishes of St. Mary and Portland, for the reception of those budded plants which would be ready for delivery beginning in August.

St. Mary.—Preparatory work actually begun in May, at first consisted of a survey of the parish in nearly every district of the central area. Eventually, concentrated work has been carried out in the following:—

- (a) Islington
- (b) Port Maria, including Oxford, Free Hill and Mason Hall.
- (c) Highgate to Clonmel and Lewis Store.
- (d) Richmond.
- (e) Windsor Castle.

Centres worked up by the Agricultural Instructor for Western St. Mary, Mr. L. A. M. B. Coke, are to be found at (a) Guy's Hill (b) Lucky Hill and Gayle.

Portland.—As in St. Mary an effort at a survey of Western Portland was made and specific work started in the following districts:—

- (a) Buff Bay area Craigmill to Belvidere.
- (b) Balcarres, Birnamwood, etc.
- (c) Skibo, Bybrook, etc.
- (d) Orange Bay, Hope Bay, Swift River, etc.
- (e) St. Margaret's Bay.
- (f) Port Antonio, Fellowship, etc.

Much of this work in Portland has been carried out by Mr. A. T. Wilmot, Inspector of Plant Diseases, who has now taken over the Citrus Extension Work in this parish.

Distribution of Plants.—It has been the principle not to deliver plants until reasonable assurance is received of the mounds being suitable for their reception. An endeavour has been made also either for a responsible officer of the Department to be present at the planting, or one of the Agricultural Instructors, or a planter who has already been proven.

Every large distribution by our truck has been attended by Mr. Sutherland or myself, or both of us. After we are satisfied that planting is being suitably performed, we leave the local people to carry on. In very few cases have we had to replant. The result is a successful establishment at every centre.

Attached is a Summary of the distribution beginning in August.

The variety which has been distributed to the largest extent is the Marsh Seedless grapefruit with Isleworth Valencia orange next.

There are now 57,448 Budded plants in the two nurseries representing different periods of development.

The hearty co-operation of the Instructors concerned has been enjoyed on every possible occasion, as also that of the Inspectors of Plant Diseases.

L. L. CARRINGTON,
Agricultural Officer.

Distribution of Varieties.

Marsh Seedless	..	..	..	8,976
Davis Seedless	..	..	..	400
Valencia, Isleworth	..	..	..	832
Valencia, Reasoner	..	..	..	88
Other varieties in small parcels	..	..	..	70
				10,366

Distribution in Parishes.

Portland	1,683
St. Mary	2,039
St. Thomas	257
St. Andrew	1,033
St. Catherine	2,352
Clarendon	672
St. Ann	578
Manchester	999
St. James	462
Hanover	137
Westmoreland	75
Trelawny	27
St. Elizabeth	25
Director of Agriculture, Fiji	27
	10,366

Of this total, 59 are supplies for dead or unthrifty plants, the majority being of plants delivered prior to the 23rd October.

L. L. CARRINGTON.

VII.—CHEMICAL LABORATORIES.

Report of the Deputy Island Chemist.

The total number of samples analysed during the year ended 31st December, 1934, was 3,639 and compares with former years as under:—

1930.	1931.	1932.	1933.	1934.
2,665	2,573	3,286	3,905	3,639

The samples are classified as follows:—

“A.” OFFICIAL SAMPLES.

(I) *Police*—

Human Viscera and Organs 104

Vomits 4

Substances for Poison 110

Exhibits in Murder cases:—

Firearms. (Revolvers) 3

Under the Coining Laws.

Coins, Genuine 202

Coins, Counterfeit 159

Bank Notes, Counterfeit and cancelled 15

Counterfeiting Exhibits 106

Under the Dangerous Drugs Law.

Opiums 13

Opium exhibits, Pipes, etc. 43

Ganga 609

Ganga exhibits, pipes, rags, etc. 113

Under the Spirit License and Rum Duty Laws.

Spirits, Rums, Whisky, etc. 20

Rum Colouring 3

Under the Medical Laws.

Medicines, Herbs, Drugs, etc. 97

Under the Drugs and Poisons Law.

Patent Medicines, (2) Medicines, (1) Poisons (1) 4

Under the Food and Drugs Law.

Cod Liver Oil Emulsion 1

Exhibits in Arson Cases.

Liquids, (14), Burnt Residues, (4) 18

Miscellaneous.

Soaps, Local Manufacture 7

Soaps, Imitation Foreign 52

Waters, Potable 2

Specimen of Fish, Lobster, and Crab 1

Rings 1

Experiments with Rum, (Effect of Common Salt on Strength) 1

Substance from Iron Safe 1

Syringe used with Liquid 1

Total

1,690

(II) Customs and Excise—

Native and Other Wines	14
Absolute Alcohols and Rectified Spirits ..	22
Denatured Alcohols, (68) Perfumed Spirits (4)	72
Spirits, Rums, Rum Punches, Liqueurs, etc.	16
Flavouring Extracts and Essences ..	160
Condensed and Evaporated Milks ..	1
Fuel Oils (64) Patent Fuels (3) ..	67
Gasolines and Kerosines (5) Turpentine	
Substitutes (1)	6
Methylated Spirits (1) Wood Naphtha (1) Mineral	
Naphtha (1)	3
Insecticides and Disinfectants	16
Wood Preservatives	6
Fabrics	10
Drugs	3
Edible Oils	2
Miscellaneous:—	
Molasses (1), Meals (1), Soaps (1),	
Beeswax (1), Wrapping Paper (1),	
Cotton Packing (1), Gum Powder (1),	
Sugar Colouring (1)	8
Total ..	406

(III) Department of Science and Agriculture—

Milk Powders	4
Feeding Stuffs	2
Animal Viscera	2
Ores and Minerals	1
Instruments (for test)	24
Total	33

(IV) Island Medical Department—

Soaps	17
Condensed Milks	2
Waters, Potable	4
Drugs and Chemicals	4
Foodstuffs	1
Medical Officers of Health:	
Fresh Milks, Genuine	1
Fresh Milks, Adulterated	2
Total	31

(V) Department of Public Works—

Native Corns	88
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(VI) Colonial Secretariat—

Coins, Counterfeit	2
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(VII) Administrator General—

Minerals	1
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(VIII) Postal Department—

Telegraph Cables	1
------------------------	---

(IX) Kingston and St. Andrew Corporation—

Red Earths, for Gas purification ..	9
Spent Oxides	4
Gas Coke (1), Gas Oils (1)	2

(X) Water and Sewerage Board—

Waters, Potable	7
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Total Official .. 2,274

"B." GENERAL SAMPLES.

Fresh Milks, Govt. Stock Farm	955
Fresh Milks, Private Persons	10
Cattle Dips	50
Sugars	129
Rums	81
Waters Potable (4), Boiler Feed, etc. (5)	9
Condensed Milks	11
Ores, Minerals, and Deposits	26
Steam Coals	4
Edible Oils (12) Essential Oils (2)	14
Animal Viscera for Poison	4
Substances for Poison	6
Horse Salivas for "dope" (22), Powders for "dope" (1)	23
Soaps, Local Manufacture	4
Lubricating Oils	3
Alcoholic Liqueurs	7
Flavouring Essences	2
Instruments (1) Containers (10) for calibration and test	11
Molasses	3
Turpentine Substitutes	2
Miscellaneous:—	
Coconut Meals (1), Honey (1), Beer (1), Bay Rum (1), Tobacco (1), Breakfast Foods (1), Grease (1) Wax Emulsion (1), Logwood Chips (1), Brines (1), Old Coins (1)	11
Total	1,365
Grand Total	3,639

The 104 analyses of human viscera and organs, and 4 vomits were made in connection with 60 deaths. In 33 cases results were obtained in the viscera, etc., as follows:—

- (1) 0.16 grains Oxalic Acid in organs of a male adult.
- (2) 0.26 grains Oxalic Acid in organs of a female adult.
- (3) 0.16 grains Oxalic Acid in organs of a female adult.
- (4) Large traces of Arsenic in the viscera of a female adult.
- (5) Traces of Arsenic and Cresols from viscera of a female child.
- (6) Large traces of Arsenic and Cresols from the organs of a female adult.
- (7) 0.5 grain Oxalic Acid in 8 ozs. of viscera of a male adult.
- (8) Free Caustic Alkali from the stomach contents of a female child.
- (9) Arsenic and Cresols from the organs of a male child poisoned by Cattle Dip.
- (10) Arsenic and Cresols from the organs of a male infant poisoned by Cattle Dip.
- (11) Large traces of Arsenic and Cresols from the organs of a male adult.
- (12) Large traces of Arsenic and Cresols from the viscera of a female child.
- (13) Cresols equivalent to nearly one oz. of Lysol from the organs of a female suicide.
- (14) Arsenic and Cresols from the organs of a male adult.
- (15) Arsenic and Cresols from the organs of a female suicide.
- (16) 1.6 grains Cresols from the organs of a male infant.
- (17) 2.9 grains Cresols from the organs of a male adult.
- (18) Arsenic and Cresols from the organs of a male infant.
- (19) Oil of Chenopodium from the stomach contents of a male adult.
- (20) 35 grains of Arsenic from the organs of a male adult.
- (21) 0.22 grains Hellebore Alkaloids from the viscera of a female adult.
- (22) 560 grains Arsenic from the organs of a male suicide.
- (23) Traces of Mercury from the organs of a female adult.
- (24) Traces of Ptomaines in the viscera of a female child.
- (25) Fine Glass (Glass Wool) from the organs of a male adult.
- (26) 26 minims Oil of Chenopodium from the viscera of a male child.
- (27) 0.4 grains Atropine in Urine and traces of the same alkaloid in viscera of a male child.
- (28) 17.4 grains Potassium Cyanide in stomach contents of a male suicide.
- (29) 0.018 grains Arsenic in the viscera of a female child.
- (30) 0.49 grains Arsenic in the organs of a male child.
- (31) 0.006 grains Arsenic in organs of a male child.
- (32) 0.009 grains Arsenic in organs of a female child.
- (33) 0.4 grains Oxalic Acid in the viscera of a male adult.

42 substances and articles which gave positive results were as follows:—

- (1) 0.53 grains Arsenic in 5 ozs. of Soup.
- (2) 0.28 grains Arsenic in 2½ ozs. of boiled meat.
- (3) Solution used by attempted suicide was found to be Potassium Permanganate.
- (4) 7 grains powdered glass in porridge.
- (5) 22.5% Arsenic as Arsenite of Soda in Cattle Dip.
- (6) 25.0% Arsenic as Arsenite of Soda in Cattle Dip.
- (7-16) 71-85% Carbolic Acid and homologues of Carbolic Acid in 10 fluids (disinfectants), 3 of which also contained traces of Arsenic.
- (17-19) Large traces Arsenic in 3 specimens of Vomit.
- (20) Arsenic and Cresols from a liquid (Cattle Dip) in a vial.
- (21) Arsenic and Cresols from a sample of Sugar poisoned with Cattle Dip.
- (22) 0.21 grains strychnine in 18 fluid ozs. of water used in an attempt at poisoning.
- (23) Cresols in a liquid (Lysol) used by a female suicide.
- (24) Cresols from clothing with vomited matter.
- (25) Arsenic and Cresols in cooked food (rice and peas) poisoned with Cattle Dip.
- (26) Ground spices in a powder said to have been used against a Chinese "Drop Pan" expert.
- (27) Broken glass in a box of Oats.
- (28) Arsenic and Cresols from a liquid (Cattle Dip) in a vial.
- (29) Arsenic and Cresols from a liquid in a condensed milk tin.
- (30) Putty Powder in water.
- (31-34) Arsenic and Cresols in Sugar and Salt (case of attempted poisoning.)
- (35-39) Powdered Glass in flour (dough) etc., in a case of an attempt at poisoning.
- (40) *Datura fastuosa*.
- (41) Human hair in rice pudding.
- (42) Potassium Cyanide in a liquid in a glass.

Miscellaneous analyses for Poison.

1 Medicine submitted in connection with a case of attempt to procure abortion consisted of a solution of quinine with ferrous and ferric sulphates.

In a case of Infanticide the stomach contents of a newly born infant was analysed in response to a request to ascertain the presence of milk therein. The results were negative for the presence of Lactose.

During the year 417 Certificates were issued to the Police Department, being an increase of 48 over last year, and 130 over 1932.

Human viscera and organs numbered 104 as compared with 101 for last year.

110 substances examined for poison showed a decrease of 33 as against 143 for last year, but the number of positive cases were greater, namely 42 as against 38.

Three Revolvers were submitted for examination in a murder case and one firearm gave positive evidence of having been recently used.

There was a decrease in the number of exhibits submitted in cases of counterfeiting coins and bank notes. Out of 361 coins examined 159 were found to be base and counterfeit. Many of the counterfeit coins were composed of harder alloys than were formerly employed and base coins showing clear impressions were usually found to be composed of bearing and type metals.

In a case of counterfeit bank notes the Police secured the engraved plates which were produced in evidence against the accused at the trial where he was convicted.

Under The Dangerous Drugs Laws the year constituted a record for Ganga, whilst Opium cases showed a diminution. Ganga and Ganga exhibits totalled 722 as against 446 for last year.

Samples submitted under the Spirit License and Rum Duty Laws also showed a substantial reduction as only 23 samples were received compared with 216 for last year.

Under The Medical Laws 97 samples were submitted which is a decrease of 57 less than the number for last year. Medicines comprised preparations of calomel, quinine, asafoetida, and various salines in addition to the usual types of "Bush" medicines.

Arson Exhibits totalled 18, being 26 less than the number for last year. In connection with the examination of Arson exhibits the Ultra Violet Light cabinet recently installed proved of great utility.

59 samples of soaps were analysed in connection with Breaches of the Merchandise Marks Law; here again the Ultra Violet Light proved of value in distinguishing between wrappers taken from cakes of a brand of soap made by a well known firm and counterfeit imitation wrappers from cakes of inferior soap. To the naked eye there was no difference between the imitation wrappers and the genuine wrappers alike in design or colouring, but under the Ultra Violet rays it was easy to distinguish the genuine from the counterfeit.

Further specimens of fish poisoned by Cresols were received, and these were taken out of Kingston Harbour.

In connection with a case of prosecution of a person for attempting to bribe a Police Officer to put salt into Rum with the object of altering the test by Syke's Hydrometer, a series of experiments were carried out to show how the apparent strength of the Rum would be altered by the addition of salt.

An attempt to open a safe in a Public Office was investigated and it was shown that Nitric Acid had been introduced into the lock. Subsequently a glass syringe was found in the same Office and examination showed that the syringe had contained Nitric Acid.

From the Customs and Excise 406 samples were analysed as against 256 for last year. The increase was largely due to a greater number of denatured alcohols, and also flavouring essences. The formula for denatured alcohols was amended to make the denatured product more characteristic. The larger number of essences was due to the new regulations which came into force governing the purity of such essences.

Ten fabrics were analysed under the "Regulated Textiles" Law and various methods of analysis of textiles made from mixed yarns were investigated, notably the determination of amino nitrogen and total nitrogen content in mulberry silk and tussah silk. The results of investigations demonstrated the utility

of microscopic observation together with determination of the total nitrogen and ash content in the analysis of composite fabrics composed either of silk or tussah with cotton or artificial silks. These investigations are being continued.

A sample of Soya Bean Curd was submitted for analysis on account of statements being made that such substance was being imported with the object of extracting the Soya Bean Oil to use the same in competition with locally made edible oil. Analysis showed the sample to contain 5.3 per cent. of oil which was present in an emulsified state and which it would be impracticable to extract on a commercial scale.

A sample of foreign Molasses was found to contain no crystallisable sugar being "Final" molasses, and imported for cooking purposes.

Amongst the 16 samples of Insecticides was a syrup composed of sugar syrup and Arsenite of Soda intended for the destruction of Ants. The danger of such a poisonous syrup to children can hardly fail to compel notice.

33 Articles, including 24 thermometers for calibration, were submitted by the Department of Science and Agriculture, being a slight increase over the number for last year.

For the Island Medical Department 31 samples were analysed as against 21 for the previous year. Of these 3 consisted of samples of fresh milk and 2 of these were adulterated. Amongst the 4 samples of drugs was a solution of Morphine Sulphate in which was a crystalline deposit which was identified as Salicylic Acid.

The 88 samples of Native corn submitted by the Department of Public Works were in connection with purchases of this article for feeding stock. Since the testing of samples of corn before purchase was instituted the quality of corn supplied has improved considerably.

Other Official samples as shown in the table above call for no special comment.

GENERAL ANALYSES. "B".

Out of a total of 1,365 samples under this heading 955 consisted of samples of milk from the Government Stock Farm, and these showed that the quality of milk from this source maintained its high standard. 10 samples of milk from private dairies were also examined.

50 samples of Cattle Dips from registered dipping tanks were analysed, and advice given regarding suitable re-charges of ingredients to bring the total contents to Standard strength.

Sugars showed a slight increase, being 129 as against 117 for last year.

Rum samples numbered 81 being an increase of 26 more than last year. In many cases the analysis was complete including secondary constituents, viz., aldehydes, furfural, and higher alcohols.

9 samples of water for domestic and boiler feed purposes were analysed and advice given in the latter cases as to softening.

Eleven samples of condensed milks in cases of suspected deterioration or substitution were submitted.

26 Minerals were analysed, and these consisted chiefly of copper ores for assay for the copper content.

12 samples of edible oils were analysed for a determination of the purity.

Of four specimens of Animal Viscera submitted for test for poisons two gave positive results for the presence of Yellow Phosphorus. One dog's viscera containing about $1\frac{1}{2}$ grains of Yellow Phosphorus.

One Polariscopes was submitted for adjustment, and examination showed that the optical system had been tampered with. This instrument was satisfactorily adjusted and returned to the owner.

A sample of Wax Emulsion for use in polishing citrus fruit was found to be an emulsion of paraffin wax with turpentine, water, and ammonia.

An old coin which was considered by the owner to be bronze was tested and found to be gold.

A visit was paid to Rock Spring for the purpose of determining the concentration of dissolved CO₂ in the well water after observations had been made regarding the corrosion of the iron casing of the well, on which a crust by hydrated ferric oxide formed. The content of dissolved CO₂ in the water as determined at the site was 9.5 parts per million.

Experiments made concerning the formation of sediment in rums showed that the cause was due to the presence of iron salts which separated as basic salts associated with resinous matter probably derived from the polymerisation of aldehydes.

A black deposit taken from the Ammonia line of an Ice Factory was found to be iron oxides coated with an emulsion of oil and water.

Other miscellaneous samples call for no special comment are shown in the Table above.

Technical advice was given to the Hon. Attorney General during the year concerning five applications for Letters Patent in respect of Inventions.

During the year the Deputy Island Chemist attended seven Circuit Courts for the purpose of giving evidence of a technical nature.

The passing of Law 4 of 1934 whereby the Certificate of the Deputy Island Chemist is admitted in evidence in cases brought under the Dangerous Drugs Law resulted in the cessation of travelling by the Deputy Island Chemist to Resident Magistrates Courts.

The gas generators and purifying plant for supplying acetylene gas to the Laboratories were completely overhauled and repaired in June with the beneficial result of an improved supply of gas and a saving in consumption of Carbide.

The manufacture of Paraph and Fly Killer was continued throughout the year. The demand for Fly Killer shows a steady increase, the amount sold last year being 332 gallons. It should be pointed out that in 1930 the greater portion of the 194 gallons then made was supplied to the Public Hospital which in 1931 commenced to make their own Fly Killer from the formula of the Deputy Island Chemist. The figures for 1931 and for subsequent years for the amount of Fly Killer supplied are, therefore, not comparable with those for 1930.

The following table shows the nature and amounts of materials supplied to the Public for the past five years, and also the amounts collected in fees and for sales during the same period.

Items.	1930.	1931.	1932.	1933.	1934.	Weight.	Remarks.
Paranaph	33,5112	36,770	34,965	39,850	33,373	Lbs.	Sale Discontinued.
Arsenite of Soda	20,175	25,499	22,021	24,818	20,300	Lbs.	
Copper Sulphate	70	160	567	8	4	Lbs.	
Carbon Bisulphide	516	669	1,174	2,010	1,164	Lbs.	
Rat Poison, bulk	162	175	225	210	130	Lbs'	
Rat Poison, 1 oz. packets	65	169	170	nil.	550	Pkts.	Ozs.
Thymol Powders	466	199	441	393	248	Ozs.	
Standard Iodine Solution	41,750	39,000	40,750	45,000	34,500	c.c's.	bottles
Starch Solution	211	221	209	245	196	bottles	
Soda Bicarbonate	48	52	30	44	31	Lbs.	Galls.
Cyanogas	76	170	42	29	25	Lbs.	
Fly Killer	194	53	132	229	332	Galls.	
Laboratory Fees	£274 3 6	£191 18 0	£221 10 9	£179 8 0	£240 1 0		
Laboratory Sales	£841 8 3	£989 10 7	£928 13 11	£1,073 8 2	£923 19 0		

2,235 Letters, Orders, etc., an increase of 164 over last year, were received and dealt with during the year. This number is not inclusive of personal orders dealt with.

During the year the Department suffered the loss of the Storeman and Boiler Attendant, T. A. Denny, who died on the 6th June, after working at the Laboratory since 6th January, 1920.

Mr. E. K. P. Blake, Technical Assistant, was absent on vacation leave for six weeks and Mr. G. A. Little, Apprentice, was absent for two months on Sick leave.

Mr. A. G. Wright was appointed apprentice on 8th October, 1934.

The Staff of the Chemical Laboratory consists of the Deputy Island Chemist, Assistant to the Deputy Island Chemist, two temporary Technical Assistants, three apprentice., and the Clerk and Storekeeper.

W. L. BARNETT,

Deputy Island Chemist.

2nd April, 1935.

The Report of the Agricultural Chemist for 1934.

A. INTRODUCTION.

The work of the Division of Agricultural Chemistry during the past year has consisted mainly in amplifying the work commenced in previous years. The number of requests for soil examination has been maintained. The knowledge of the main soil types and of the variations within the types has been increased considerably. The main extensions of work have been in relation to banana experiments and to statistical work. With the destruction by hurricane in October, 1933 of the banana manurial experiments for the second time, it became desirable to select fresh areas, and to inaugurate new experiments. A large area of experiments has been laid down. These experiments will be reaped during 1935. Through the aid of the Sugar Manufacturers' Association it has been possible to extend the Sugar Cane Survey work to include all varieties of cane, and to arrange for a system of circulating sugar factory data during the crop.

A considerable number of subsidiary problems of the major crops have come into prominence during the year. Investigation of such problems have been pursued as far as the available facilities would permit. Among the chief of these problems are the relation of soil and the incidence of Panama Disease, the maintenance of the production of old ratoon bananas by the use of artificial manures, the requirements and production of an ideal cover crop for bananas and the closely related problem of the effect of mulch on bananas, and the production of sugar cane on the shotty inland basin soils. An investigation of the value of artificial manure to the citrus in Jamaica has been commenced.

The sugar cane crop of 1933-34 was exceptionally good, though juices were on the whole poor. A record production of sugar for the island was made. The increased yield, and low prices of sugar, and the stagnant condition of the market have brought the sugar manufacturers of the island to realise the importance of obtaining the maximum returns from their canes. Improvements to machinery have followed and increased interest in the minimum losses in the factory has been taken. A number of factories operated under chemical control for the first time during the past year, and a considerably greater efficiency in manufacture has resulted.

The increased interest in the value and use of artificial manures has been maintained. The importation of manure during the past few years has increased considerably. The increase has been due mainly to the increased use of manures on bananas, and partly to their use on a greater area of sugar cane. It is estimated that 65 per cent. of the cane sent to sugar factories is now grown with the aid of artificial manures, while a few years ago artificial manures were applied to only 30 per cent. Heavier dressings could be applied with advantage in certain areas.

B. SOIL SCIENCE AND AGRICULTURAL CHEMISTRY.

1. SOILS.—

The general soil survey work performed in previous years with the co-operation of interested planters has been continued. Particular attention has been paid to the quality of the crop produced by the soil under examination. The majority of requests for soil examination have come from banana planters.

These requests have reflected the general interest there is at present in the use of artificial manures on bananas. This interest has been stimulated by the necessity for producing the maximum yield from the areas of banana soils now substantially reduced by the inroads of Panama Disease.

(a) **BANANA SOILS.**—A preliminary survey was undertaken to determine whether there was any material difference between soils in which Panama Disease appears to spread rapidly and soils in which the spread of infection is relatively slow. The area selected for the investigation was the area on the borders of St. Mary and St. Catherine. The area is broken up by irregular hills and valleys. The soils vary considerably but are derived mainly from the Trappean Shales and Yellow Limestone formations. Additional areas in St. Mary were examined to include soils from the Richmond Bed formation. Samples from thirteen areas of slow spread and sixteen areas of rapid spread were examined. With the available staff it was only possible to undertake routine analyses in the Laboratory.

The main conclusions which could be drawn from this preliminary investigation were:—

(1) No soils appear to be highly resistant to infection when they are repeatedly re-infected by flooding. Some areas pronounced as resistant at the time of the survey have since been abandoned.

(2) There is no apparent relation between the rate of spread of the disease and the aeration, nutrient status, or texture of the soil as determined by the routine methods in use.

(3) The risk of the disease spreading rapidly on hillside soils is greater on acidic soils than on neutral or alkaline soils. Areas of rapid spread which are alkaline have been found, however.

(4) On highly acidic soils (pH 5.0 and below) there is a high probability of the disease spreading rapidly.

(5) Some unknown soil factor appears to influence the rate of spread of the disease. That factor may be indirectly, but probably not directly, related to the acidity of the soil.

The examination of numerous soils of varied productive capacity has shown that soils of comparatively low nutrient status are capable of producing profitable crops of bananas. The comparison of soils has been greatly handicapped by the general lack of production data of individual fields. The yield of the majority of fields is estimated rather than recorded. In general, soils containing relatively high amounts of nutrients with a high proportion of available potash produce good bananas, even though the amounts of available phosphate and total nitrogen may be low. Mulching in the dry season will make a soil of low nutrient status relatively productive.

The question of the effect of soil acidity on the growth of the banana apart from its influence on disease susceptibility has been given some consideration. Extensive studies have not been possible, but the general indication is that while the banana undoubtedly grows and produces better in a neutral or alkaline soil, it is not seriously affected by the acidity of the soil, and is by no means as sensitive as sugar cane. Bananas producing reasonable yields and grades have been found growing on soils of pH value less than 5.0. Liming trials have been commenced on these soils.

Steps to collect sufficient seed to put down a number of cover crop trials in various banana growing districts have been taken.

(b) **SUGAR CANE SOILS.**—The main demand with regard to sugar cane soils has been for determination of acidity and lime requirements. A number of infertile shotty inland basin alluvial soils have also been examined.

(c) **COCONUT SOILS.**—A few coconut producing soils have been examined. Some of the soils growing bearing coconuts proved on inspection to be highly unsuitable for that crop. The necessary amelioratory treatment could not be used economically. Under the present conditions of the coconut market, the areas examined could not be maintained in production except in so far that the area is also used as pasture and the cost of upkeep of the coconuts is a minimum. Other areas have been noted, however, where by removing half of the number of trees and growing sugar cane between the remainder the yield of coconuts per acre has been increased. It is significant that the soil of one of the highest yielding coconut estates on the island is not highly suitable for coconuts, but is maintained in a state of cultivation and is carefully drained.

(d) **MISCELLANEOUS SOIL MATTERS.**—A survey of a sugar estate using micro soil tests has been undertaken by a sugar chemist who has been retained for the out-of-crop period for this purpose.

A number of soils have been studied spectroscopically for traces of the less common soil-forming elements. It has been found necessary to consider a scheme of initial concentration of such elements by chemical means.

Areas of saline soil occurring in some places on the surface and in others at a depth of 2-3 feet have been found in the southern alluvial plain at a considerable distance from the sea. The salinity would seriously affect the production of an economic crop.

(e) **SUMMARY OF WORK ON SOIL SAMPLES.**—

Total number of soil pits examined (including 2' and 6' depth pits)	86
Total number of soil samples examined	692
No. of reports issued to estates on the results of Soil Examination	23

2. GENERAL AGRICULTURAL ANALYSIS.—

The following samples of agricultural interest have been examined in the Agricultural Chemistry Laboratory during the year:—

Guanos (bat and sea bird)	35
Limestones, etc.	10
Plant Ashes	4
Miscellaneous manurial materials	7
Irrigation waters	24
Cane juices	12
Miscellaneous	10
Total	102

The majority of bat guanos examined contained less than 3 per cent. nitrogen. A few contained over 20 per cent. of total phosphoric acid.

The Limestones received with few exceptions were of high quality.

Many of the samples from potential sources of irrigation water were too saline for use in the irrigation of crops.

A sample of residual wash obtained after pimento leaf oil had been allowed to settle was examined. The sample contained a relatively large amount of pimento oil.

3. CITRUS MATURITY TESTS.—

A series of tests of citrus fruit, orange and grapefruit, have been made in co-operation with the Chief Inspector of Produce. It was arranged to obtain a series of weekly samples from two grapefruit trees and two orange trees. The sampling was commenced considerably before the fruit was ready for picking, and is being continued until the fruit is fully mature and ripe. Routine tests performed on the juices include tests of density, volume, acidity, pH value, buffering action, conductivity, and reducing and total sugars. The tests had not been completed by December, 1934, and are being continued.

4. COCONUT ASH TESTS.—

Considerable interest in the use of coconut ash as a source of potash for manuring has been shown by a number of planters. It was found that in some cases coconut trash ash and ammonia-containing manures were being applied simultaneously with, it was claimed, highly successful results.

A series of determinations were conducted to demonstrate by figures the loss incurred by mixing alkaline material of the nature of ash with artificial ammonia-containing manures. The experiments showed that under moist, exposed conditions as much as 83 per cent. of the ammonia was lost from the mixture in a period of five days.

Subsequent investigations have demonstrated the importance of obtaining plant ash for use as manure in a fresh dry condition. Prolonged exposure to the weather can deplete the ash until its content of potash is negligible. Even when the ash is stored in heaps leaching by rain may render the ash valueless in a relatively short period of time.

5. A. I. V. SILAGE.—

The two pits of silage, one of guinea corn, and the other of guinea grass, which were laid down in December, 1933 were opened in July and August. The Silage produced was of good quality and proved palatable to animals. A certain amount of waste occurred in the guinea grass.

The cost of making the silage was considerably greater than the cost of making it by the normal tower process due to the high cost of the acid required. Negotiations for obtaining cheaper supplies of acid have been concluded, and it is hoped with the aid of the experience gained in the past experiments to continue the experiments with a view to producing the silage at an economic cost.

6. STATISTICAL WORK.—

(a) CANE YIELD SURVEY.—The results of the Survey of Cane Yields in Jamaica for the 1932-33 crop were published during the year. The survey has been continued for the following crop.

The original survey was confined to returns from seedling canes, but it was considered desirable to obtain records of yields during the past crop of all types of cane. It has been possible to undertake the additional work only by the assistance of the Sugar Manufacturers' Association, which has provided a Statistical Clerk and office equipment for his use. Returns amounting to nearly 80 per cent. of the total cane ground at factories in the island have been received. The remaining 20 per cent. includes the cane from a few estates with factories which have not submitted returns and the cane grown by small cane farmers. The returns have been analysed with a view to comparing the performances of the different varieties under the ecological conditions existing in Jamaica. The results of the 1934 Survey will be published in a special Bulletin.

(b) RAINFALL OF SUGAR ESTATES.—An examination of the rainfall of sugar estates has been undertaken, and the available records have been obtained from all sugar estates in the island. These records are being examined statistically with a particular view as to the variability of the distribution of rainfall, and a report is being prepared. The distribution of rainfall in any area may be an important factor in determining the most suitable cane variety in that area.

(c) CIRCULATION OF SUGAR FACTORY DATA.—Preparations have been made for the collection and distribution of factory data during the 1935 crop. It is proposed to collect information monthly and circulate a summary of that information to each contributing factory. All factories in the island having chemical control have promised to contribute to the scheme.

7. ADVISORY WORK.—

Numerous enquiries concerning soil problems and in particular concerning the application of manures to bananas have been received.

Demonstrations of the micro methods of soil analysis have been given.

Many miscellaneous matters, among which have been problems concerning the preparation of artificial organic manure, weed eradication, have been discussed.

8. PUBLICATIONS, LECTURES, ETC.—

Two Departmental Bulletins have been published during the year. They are "A Survey of the Yields from Seedling Varieties of Sugar Cane in Jamaica 1932-33," Departmental Bulletin No. 1 (New Series), and "Field Experiments on Sugar Cane in Jamaica 1932-33" Bulletin No. 2. (New Series).

Articles reporting the results of work on small problems of local interest have been published in the Journal of the Agricultural Society.

A lecture was delivered during the Summer Course arranged by the Department.

The half-yearly meetings of the Jamaica Agricultural Society were attended.

The Agricultural Chemist has been appointed Secretary of the Advisory Committee on the Sugar Industry. Two meetings were held during the year.

A visit was received during the year from Dr. A. McIntosh, Geneticist to the Department of Agriculture, Barbados. An inspection of the sugar producing areas was made in his company, and the general methods by which this Division could assist the Officers of the Central Cane Breeding Station were discussed in detail.

Mr. R. S. Martinez, Superintendent of Agriculture, has assisted in the work of the laboratory when not engaged on other duties.

C. FIELD EXPERIMENTS.

1. SUGAR CANE.—

(a) MANURIAL EXPERIMENTS.—The experiments commenced in 1933 have been continued during the year under consideration. The results have confirmed the findings of previous years which have already been recorded. The yields of the ratoon crops have been maintained by the use of artificial manures. Attention has been given to the effect of applying heavier dressings of artificial manures, and experiments have been laid down with the object of determining the highest economic dressing under various climatic conditions. One experiment of this type reaped during the year showed that in an area plentifully supplied with water but not irrigated, a dressing of more than 6 cwt. per acre did not produce an increased tonnage.

Number of experiments reaped	..	..	7
No. of experiments continued until 1935 and relaid during 1934	..	..	4
Varietal experiments laid down	..	..	3

Two experiments were not reaped owing to the damages they received by weather. The two new experiments laid down in 1933 are due to be reaped in 1935. The detailed results of the experiments will be published in a special Bulletin.

(b) HALF FIELD EXPERIMENTS.—A memorandum on the subject of half field experiments on sugar cane was circulated during the year with a view to encouraging planters to undertake their own experiments.

The difficulties and failings of such experiments were enumerated in the Memorandum, and conditions for obtaining reliable results were indicated. It was suggested that where possible the experimental field be divided into areas and each area reaped separately in the crop previous to the application of the treatment. An estimate of the probable fundamental difference in yield between the various sections can thus be obtained. A number of estates have undertaken such experiments.

(c) VARIETAL EXPERIMENTS.—During the year a decision was reached to the effect that Jamaica would co-operate in the British West Indian Central Sugar Cane Breeding Station in Barbados. Following a visit to Jamaica by the Geneticist to the Station it was decided to lay down a series of varietal experiments with the varieties already present in the island. Diverse opinion as to the values of these varieties in the various ecological areas made it desirable to obtain certain knowledge of their behaviour before the situation was further complicated by the introduction of more varieties from Barbados. Furthermore, detailed information on the behaviour of the present varieties would form a valuable guide to the deficiencies in those present and the improvements required in new varieties. Three varietal experiments have been laid down during the year and are due to be reaped in 1936.

2. BANANAS.—

The effect of a hurricane for the second year in succession made it necessary to abandon all except one of the banana experiments in progress. During the year three major experiments were laid down comprising over one hundred plots.

The main objects of these experiments are:—

1. To test the effect of a complete artificial manure on bananas.
2. To compare manures of different ration compositions.
3. To compare the effect of organic and inorganic manures.
4. To determine the effect of cover crops.

These experiments were laid down in June and July and reaping the plant crop should commence early in 1935.

Two further experiments have been commenced in an area surrounded by small settlements on old ratoon crops. One of the difficulties in areas liable to be badly affected by Panama Disease is that planting appears to increase susceptibility to Panama Disease. The object of the experiment is to determine whether it is possible to cease replanting and still maintain the yield by the application of artificial manures. One experiment to determine whether artificial manure can affect the incidence of Panama Disease has been commenced.

An experiment to determine whether artificial manure could improve the quality of fruit from certain seedling varieties of bananas has shown that under the conditions of the experiment the manure produced no appreciable effect.

Of the experiments laid down in 1932, one had come into bearing by November, 1933. A number of stems of fruit amounting to approximately one-fifth of the total stems to be reaped in the experiment had been reaped before the standing trees were destroyed by the hurricane. The results obtained from the incomplete returns are suggestive in that:—

- (a) That more fruit had been reaped from the plots receiving manure.
- (b) The number of hands per bunch was on an average 0.3 hands more on the manured than the unmanured plots.

The majority of the banana lands in Jamaica are on hillside lands. One of the main difficulties in conducting manurial experiments on bananas has been in obtaining uniform fields of suitable areas and shape for reliable experiments. Secondly, the necessity of reaping fruit from the experiments irregularly

and at short notice renders the supervision of recording the results difficult. A system of tagging has simplified the reaping considerably, but when weight records are desirable it is necessary for a competent officer to be in attendance at each reaping, and the number of experiments which can be undertaken is thereby limited. Eleven experiments are now in progress, but it may only be possible to obtain weight records from a fraction of them.

3. COCONUTS.—

The poor physical condition into which many of the coconuts of the island have fallen following periods of excessive rain, wind and drought, made it advisable to consider giving such trees an artificial stimulus to restore them to normal condition. With this object two trials involving manurial and cultivation treatments have been commenced. It was not possible to undertake elaborate experiments, but it is hoped that the present simple trials will give sufficient indication to enable them to act as guides towards further experiments and treatments.

4. CITRUS.

A series of minor trials with different manures have been undertaken with the co-operation of the Agricultural Officer of the Department. The trials are not sufficiently elaborate to give reliable quantitative results, but should provide valuable indication of the probable response of citrus to artificial manures.

One more elaborate experiment has been laid down in co-operation with a citrus planter.

5. PASTURES.—

Trial plots of manured guinea grass have been commenced with the co-operation of the Superintendent of Grove Place. One of the main advantages of applying artificials to pastures in Jamaica, apart from causing an invaluable increase in nitrogen content so deficient in Jamaican pastures, is that an increased yield in grass would reduce the area of pasture required to support cattle in the dry season. As this area is the limiting factor in determining the number of cattle which any one estate can carry, an increased yield would enable a greater population to be supported.

The majority of the field work required in connection with laying down and reaping the above experiments has been performed by Mr. M. S. Goodman, Superintendent of Public Gardens and Sugar Cane Experiment, and Mr. R. S. Martinez, Superintendent of Agriculture.

H. H. CROUCHER.

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